THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

LONDON:—TRUBNER & CO., No. 60 PATERNOSTER ROW.

VOL. IV.—No. 68. NEW-YORK, WEDNESDAY, OCTOBER 15, 1862. $3 PER ANNUM.

HERRING'S PATENT

Champion Fire-Proof Safes.

Herring's Champion Burglar-Proof Safes with Herring & Floyd's New Patent Crystalized Iron, the only metal which cannot be drilled.

Nearly 25,000 Herring's Safes have been made and sold, and over 500 have passed triumphantly through accidental Fires, thus fully sustaining their acknowledged and well-earned character as the "best Fire-Proof Safes the world ever saw."

Herring's New Patent Burglar-Proof Safes, made of a combination of Wrought Iron, Patent Crystalized Iron, and Bars of Steel, are confidently offered to the public as the strongest and best security against skilful burglars now extant.

It was a "Herring's Burglar-Proof Safe," the public will remember, which so lately held secure its trust against the determined ingenuity of the boldest and greatest mechanical burglars this country has ever known, and saved for the New York Exchange Bank no less than

HALF A MILLION OF DOLLARS.

Herring's Patent Fire and Burglar-Proof Safes *combined*, (one Safe within another,) making the most perfect protection from fire and thieves now known.

FIVE OF HERRING'S SAFES VICTORIOUS!

WELLSBORO', Penn., December 21, 1861.

Messrs. Herring & Co., New York:

Gentlemen,—At the great fire which occurred here on the 18th December last, my store, with a number of other buildings, was entirely destroyed; no less than seven places of business were burnt out and five of your safes severely tested, in every instance saving their entire contents, to the complete and perfect satisfaction of the owners. Two of your Herring's Patent Champion Safes which were in my building remained there through the entire conflagration, and were not opened until the day after the fire. No water was thrown on the building. Everything in my safe after the fire was nearly as good as new. C. L. Wilcox also preserved all his books, papers, and money in two of your safes, both being in same fire. Wm. Roberts was also the fortunate owner of another of your Patent Champion Safes, which was severely tested, and saved completely his books, papers, and money. The result has given great satisfaction, and we want no safe but Herring's Champion. Please send me one same size I last bought of you immediately. Send by N. Y. & Erie R.R. via Tioga depot. JOHN R. BOWEN.

I had two of Herring's Safes in above fire. They saved my books, papers, and $2,000 *in bank bills*. C. L. WILCOX.

HERRING'S PATENT CHAMPION saved my books, papers, and about $400 in *paper money*. I would use no other. WILLIAM ROBERTS.

GREAT FIRE IN PEARL AND FULTON STS.

NEW YORK, Jan. 27, 1862.

Messrs. HERRING & Co., No. 251 Broadway:

Gentlemen,—The large HERRING'S PATENT CHAMPION SAFE you made for me a few years ago has been put to a severe test in the great fire corner Fulton and Pearl sts., on the 26th inst., which entirely destroyed my building, together with many others.

The fire commenced about 6 o'clock on Sunday morning, and the safe was taken from the ruins after an exposure of more than thirty hours.

Your Safe contained all my books, insurance policies, and other valuable papers besides, gold and silver, bank bills, coupon bonds, &c., amounting to over Two Hundred Thousand Dollars. Everything in the Safe is in perfect order, except the binding of the books being steamed.

Your Patent Champion Safe gives us great satisfaction, and has guarded safely through the fire every dollar of its contents.

Truly yours, A. S. FOSTER.

GREAT FIRE IN NEW JERSEY.

NEW BRUNSWICK, N. J., January 18th, 1862.

Messrs. HERRING & Co.,

No. 251 Broadway, New York:

Gentlemen,—At the recent extensive fire in our city, on Wednesday morning last, 15th inst., I was the fortunate owner of one of your HERRING'S PATENT CHAMPION SAFES, which contained some books and a number of valuable papers.

The heat in my store was very great, and the safe subject to an intense heat. I felt great interest in the safety of my papers, as a number of castings in my store and within a few feet of the safe were melted. Nothing, indeed, was saved in my building, except the contents of your safe, which I am happy to inform you was completely preserved, after a thorough roasting for some seventeen hours. The result has exceeded my anticipations, and fully confirmed my confidence in the security of your Herring's Patent Safe. Please send me another of larger size, and refer all incredulous to my books and papers, which it gives me great pleasure to show.

WM. H. ARMSTRONG.

Herring & Co., 251 Broadway.
Farrel, Herring & Co., Phila.
Herring & Co., Chicago.

IRON FOUNDRIES.

BERGEN IRON WORKS, Established 1833.

R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

S. V. MERRICK, J. VAUGHAN MERRICK, W. H. MERRICK.

SOUTHWARK FOUNDRY, Philadelphia.

MERRICK & SONS, Engineers, Manufacturers of every description of Gas Machinery

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either TELESCOPIC OR SINGLE, WITH SUSPENSION FRAMES COMPLETE; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.

Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

S. FULTON & CO., (Successors to Colwell & Co.) Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, also Heavy and Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

SAMUEL FULTON, THEO. TREWENDT.

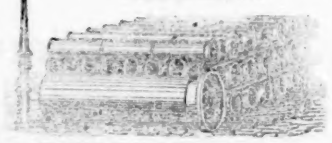
TRANER & MERCER, 117 NORTH Water Street, & 124 North Wharves, Philadelphia. AGENTS FOR THE MERCER FOUNDRY, AND ELK SHEET IRON WORKS.

CAST IRON STREET MAINS; *Bends, Branches, Chemical Retorts, and all kinds of Castings for* GAS-WORKS, either COAL or ROSIN WORKS. SHEET IRON FOR GASOMETERS *cut and punched to order*. BOILER IRON *of all descriptions*. RUSSIA SHEET IRON, TIN PLATES, BLOCK TIN, COPPER, PIG LEAD, SPELTER, and Metals generally.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.

JOSEPH G. JONES,
205½ Walnut Street, Philadelphia.

R. D. WOOD & CO.,
MANUFACTURERS OF
CAST-IRON PIPE, RETORTS, &c.
Office, 400 Chestnut street,
PHILADELPHIA.



TO GAS AND WATER COMPANIES:

The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, is prepared to contract for all descriptions of Cast-Iron Pipes of their manufacture.

About 6,000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.

ARCH'LD BAXTER, 28 Beaver St., N. Y.
Sole Agent for the United States and Canada

THE ALPHA TUBE WORKS,
WALSALL, STAFFORDSHIRE.—Established 1830.

LAMBERT BROTHERS,
Manufacturers of
LAP-WELDED BOILER TUBES, LOCOMOTIVE AND MARINE ENGINE FITTINGS,
WROUGHT IRON WELDED PIPE,
FOR STEAM OR HIGH-PRESSURE WATER AND GAS;
HIGH-PRESSURE STEAM AND WATER VALVES,
FIRE & GARDEN ENGINE WORK, PUMPS, HYDRANTS, WATER-CLOSETS,
IRON AND BRASS GAS-FITTINGS, GASELIERS, &c.,
AND OF THE GROVE BEDSTEAD WORKS, WALSALL.
Delivery Free, in Liverpool, &c.
Catalogues post free.

A small *general* selection of current Manufactures for the Steam-engine, Water Supply, Gas-Works, Distilleries, Brewery, Chemical Works, Mills, &c., at the International Exhibition, Walsall Court, Class 31.

IRON FOUNDRIES.

MORRIS, TASKER & CO., PASCAL IRON WORKS,
[ESTABLISHED 1821.]

PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,

GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

GAS AND STEAM FITTERS' TOOLS, &c.

STEPHEN MORRIS, CHAS. WHEELER,
THOMAS S. TASKER, STEPHEN P. M. TASKER.

CAST IRON WATER, GAS, DRAIN AND HEATER PIPES, &c.,
COLUMBIAN IRON WORKS,
OFFICE, No. 46 NORTH SEVENTH STREET, Below Arch Street, Philadelphia.
THOS. M. ADAMS, Proprietor.

S. S. ASHCRAFT, CINCINNATI, O., Manufacturer of Gas and Water-Pipes, with Branches of every description; Retorts for Gas and Oil Works; Gasholder Stands, Columns, &c.; Gas Purifiers, Condensers, and Gas Apparatus of all kinds; Foundry Work in general.

N. B.—A complete selection of Patterns on hand. Refer to any of the Gas-Works in the Western and Southwestern States.

THEODORE SCOWDEN, Engineer, Louisville.
JOHN JEFFREY, Civil Engineer, Cincinnati.
JACOB HOUGHTON, Engineer, Detroit.

WARREN FOUNDRY AND MACHINE CO., Phillipsburg, N. J. Manufacturers of Cast-Iron Pipes, from 2 to 48 inch diameter, all pipes from 3 inch to 48 inch cast vertically, and in dry sand, in lengths of 12 feet. 2 inch pipes in lengths of 7 feet. Special Castings of all descriptions furnished at short notice.

REFERENCES.

Croton Aqueduct dept., N. Y.
Manhattan Gas Lt. Co., N. Y.
Brooklyn Water dept., N. Y.
Brooklyn Gas Lt. Co., N. Y.
Citizens' Gas Lt. Co., Brooklyn, N. Y.

TO VERTICAL PIPE MANUFACTURERS.—WANTED, a situation as Foreman, or would prefer taking the work by contract, by a man that has had twenty years' experience in Vertical Pipe Moulding; also, has had some years' experience in Green Sand Moulding; best of reference given. by addressing FIRTH & INGHAM, Warren Foundry and Machine Shop, Phillipsburg, New Jersey.

PATENT-OFFICE NOTICES.

UNITED STATES PATENT-OFFICE,
WASHINGTON, April 17, 1862.

ON THE PETITION OF PHEBE Ann Fisk, Executrix, &c., of Almond D. Fisk, late of the City, County, and State of New York, praying for the extension of a Patent granted to the late Almond D. Fisk, Nov. 14, 1848, and re-issued March 6, 1860, for an improvement in Coffins, for seven years from the expiration of said Patent, which takes place on the 14th day of November, 1862.

It is ordered that the said petition be heard at the Patent-Office on Monday, the 27th of October next, at 12 o'clock m.; and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Persons opposing the extension are required to file in the Patent-Office their objections specially set forth in writing at least twenty days before the day of hearing; all testimony filed by either party to be used at the said hearing must be taken and transmitted in accordance with the rules of the office, which will be furnished on application.

The testimony in the case will be closed on the 13th of October next; depositons and other papers relied upon as testimony, must be filed in the office on or before the morning of that day; the arguments, if any, within ten days thereafter.

Ordered, also, that this notice be published in the "National Republican," Washington, D. C., and "Tribune," New York, N. Y., once a week for three successive weeks; the first of said publications to be at least sixty days previous to the day of hearing. D. P HOLLOWAY,
Commissioner of Patents.

"NEW BOOKS." ANY OF OUR Readers who may require books on the subject of Gas-Light, Heat, Water, Sewerage, or other scientific matters, can be promptly supplied by addressing the Publisher of The AMERICAN GAS-LIGHT JOURNAL, No. 58 Liberty st., New York.

COAL-OIL & CANDLES.

THE LUTHER ATWOOD OIL COMPANY'S

DEODERIZED

ILLUMINATING OIL,

Unsurpassed by any KEROSENE manufactured. Is nearly COLORLESS, of a PLEASANT ODOR, and burns without smoke, or crusting the wick.

WARRANTED NON-EXPLOSIVE.

For sale in any quantity at a greatly reduced price.

Packed in cans and cases for foreign markets. Apply to U. TALLMAN,
84 Burling Slip, New York.

COAL OIL! COAL OIL!! of the celebrated brand of "SILVER SPRING." A superior burning oil, white, pure, safe, and odorless.

J. S. STANTON, Manufacturer,
No. 132 Maiden Lane.

A LAMP CHIMNEY THAT WILL not break.—Made for the million.

The patent Mica Chimneys for coal-oil Lamps possess many advantages over the glass chimneys. They do not break from the heat, falling, cleaning, or any ordinary usage. When one is purchased it will last, with care, as long as the lamp. They fit all the burners now in use.

AMOS HORNING,
Agent for Manufacturer,
No. 321 North Second st.,
Philadelphia.

N. B.—Coal-Oil Lamps and Coal-Oil at low rates.

PATENTED OCT. 8, 1861.

Dithridge's Patent

OVAL LAMP CHIMNIES,

for Coal-Oil burners. Manufactured of

XX FLINT GLASS.

These chimnies are intended for the flat flame which, heating all parts of the glass equally, does not expose it to cracking.

E. D. DITHRIDGE,
Fort PittGlass Works,
Pittsburg, Pa.

THE LOVERS' LAMPS.—Price Five Shillings ($1.25) each. To supersede Candles and Night Lights. No Dressing or Trimming required.

EDMUND SPILLER,
Patentee,
98 HOLBORN-HILL, LONDON.
Post-Office orders attended to.

Ambrose's
PATENT
COAL-OIL,
NO-CHIMNEY
BURNER,

For Portable LAMPS, LANTERNS, Etc. Requires no Chimney.

Address,
J. E. AMBROSE,
249 Pearl st.,
New York, or
45 Newark Av.,
Jersey City, N. J.

AGENTS.—TO ALL WHO USE Candles.—The Candle Lamp just out. Safety and economy in light. No excuse for using explosive fluids. No dropping of tallow on carpets. The Candle Lamp will be sent free on receipt of 25 cents. Agents, male and female, can make a larger profit, and find a quicker sale for the Candle Lamp, than any article yet offered to the public. Send red stamp for illustrated circular.

WM. SUMNER, 208 Broadway, (room No. 10,) N. Y. city.

GAS THERMOMETERS FOR ascertaining and regulating the temperature of the gas while passing through the purifiers into the station meters. For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

THE

STERLING GAS-REGULATOR,

Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW YORK.

To keep in order, and always maintain the pressure of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

WARREN'S PATENT WATER & ALARM GAUGE

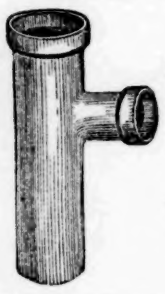
For Protecting the Flues and Preventing Steam-Boiler Explosions.

This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

WARREN & BANKS,

153 Centre st., corner of Canal st., New York,

Where a Gauge is constantly in operation.



GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE,

FROM

JOSEPH CLIFF

Wortley Fire-Brick Works, Leeds, England.

T. W. PARMELE, Agt.,

No. 4 Irving Place, N. Y.

JOHN RUS ELL & CO.,

PATENT TUBE MAKERS,

THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE,

69 UPPER THAMES ST., & 5 CHARLES ST., SOHO, LONDON;

AND 35 GRANBY ROW, MANCHESTER, ENGLAND.

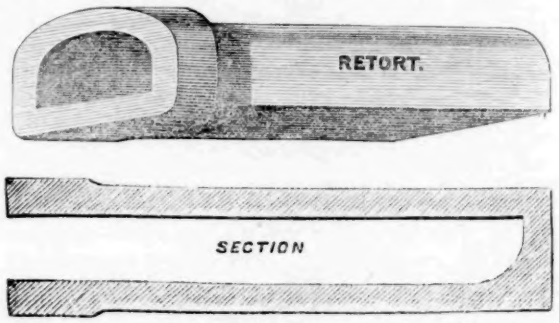
The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lap-welded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water Galvanized and Composition Tubes. Chandeliers, and every kind of Brass work for Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST-IRON PIPE AND GAS-METERS.

A 1 Goods Warranted.

KING BROTHERS,

STOURBRIDGE, ENGLAND. FIRE-BRICK AND RETORT WORKS.



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

Free from Cracks and Correct in Form.

By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

Apply to E. W. BARSTOW, 83 Maiden Lane, New York, where samples can be seen.

HARRIS & PEARSON,

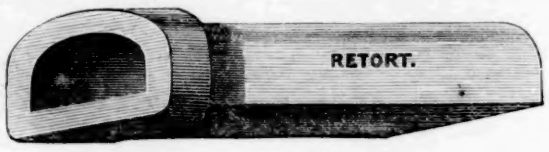
PROPRIETORS OF

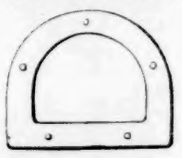
Best Glass-House Pot & Crucible Clay.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

COWEN'S PATENT FIRE-CLAY RETORTS.





JOSEPH COWEN & CO.,

BLAYDON BURN, near Newcastle-on-Tyne, England,

Have always been, and are still, the most extensive manufacturers of FIRE-CLAY RETORTS in the United Kingdom, and were the only parties to whom a Prize Medal was awarded at the Great Exhibition, in London, 1851, for

"GAS RETORTS, AND OTHER OBJECTS IN FIRE-CLAY."

J. C. & CO. make Fire-Clay Retorts of all shapes and dimensions, and to fit existing mouth-pieces.

Orders for FIRE-CLAY RETORTS, TILES, BEARERS, and other articles in Fire-Clay, receive immediate attention, and are promptly executed at their Works, as above. Drawings of Settings adapted for Cowen's Patent Fire-Clay Retorts supplied.

AGENTS, MESSRS. MEAD & BELL,

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N. B.—J. C. & CO.'S RETORTS are well adapted for small Gas-Works, as they can be used without an Exhauster.

WHERE GAS-WORKS AND WATER-WORKS ARE WANTED.

We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

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ARRANGED BY STATES AND COUNTIES,

Showing where Gas-Works and Water-Works are Wanted.

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Dell Prairie,	Little Lake,	Quincy,
Edna,	Mill Haven,	Roche-a-Cri,
Fountain,	Necedah,	Strong's Prairie,
Friendship,	New Chester,	Twin Valley,
Germantown,	New Rome,	White Creek,
Grand Marsh,	Pilot Knob,	Wonewoc.

Bad Ax County.

Bad Ax,	Hillsborough,	Retreat,
Bergen,	Hockley,	River Side,
Bloomingdale,	Kickapoo,	Romance,
Breckinridge,	Mount Tabor,	Sierra,
Carvosso,	New Brookville,	Springville,
Coon Prairie,	New Salem,	Star,
Debello,	Newville,	Victory,
De Soto,	Ontario,	Viroqua,
Goole,	Readstown,	Warner's Landing,
Harmony,		Webster.

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Denmark,	Green Bay,	Suamico,
De Pere, (c. h.,)	Mukwa,	Wequiock,
Fort Howard,	New Franken,	Wrightstown.
	Oneida,	

Buffalo County.

Alma,	Gilmantown,	Maxville,
Buffalo,	Glencoe,	Montlovi,
Fountain City,		Waumandee.

Calumet County.

Brant,	Dundas,	Pequot,
Brillion,	High Cliff,	Rantoul,
Charlestown,	New Holstein,	Sherwood,
Chilton,		Stockbridge.

Chippewa County.

Bloomer Prairie,	Chippewa Falls,	Eau Claire,
Chippewa City,		Lafayette.

Clark County.

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Neillsville,		Weston Rapids.

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Beaver Creek,	Leeds,	Pigeon Grove,
Bellefountain,	Leeds Centre,	Portage City,
Cambria,	Lodi,	Port Hope,
Columbus,	Lowville,	Poynett,
Dekorra,	Marcellon,	Rio,
East Randolph,	New Haven,	Rocky Run,
Empire Junction,	North Leeds,	Shoneaw,
Fall River,	Okee,	Welch Prairie,
Fort Winnebago,	Oshaukuta,	West Point,
Hampden,	Otsego,	Wyocena.
	Pacific,	

Crawford County.

Batavia,	Mount Sterling,	Somerville,
Belle Center,	Ocena,	Teller's Corners,
Crow's Mills,	Prairie du Chien,	Towerville,
Eastman,	Rising Sun,	Wauzeka,
Lower Lynxville,	Rolling Ground,	Wright's Ferry,
Marietta,	Seneca,	Yankeetown.
	Sladesburgh,	

Dane County.

Albion,	Eolia,	Pleasant Branch,
Ancient,	Fitchburgh,	Primrose,
Ashton,	Hanchettville,	Rockside,
Belleville,	Lake View,	Roxbury,
Berry,	Leicester,	Rutland,
Black Earth,	Macfarland,	Spring Dale,
Blue Mound,	Madison,	Stoner's Prairie,
Berke,	Mazo Manie,	Stoughton,
Cambridge,	Middleton,	Sun Prairie,
Christiana,	Mount Vernon,	Sweet Home,
Cottage Grove,	Oregon,	Utica,
Cross Plains,	Paoli,	Verona,
Dane,	Peatville,	West Middleton,
Deerfield,	Peirceville,	Westport,
Door Creek,	Perry,	Windsor,
Dunkirk,	Pine Bluff,	York.

Dodge County.

Alderly,	Hermann,	Mayville,
Atwater,	Horicon,	Napasha,
Beaver Dam,	Hustisford,	Neosho,
Burnett,	Iron Ridge,	Oak Grove,
Chester Station,	Juneau,	Portland,
Clyman,	Kekoskee,	Reeseville,
Danville,	Le Roy,	Rolling Prairie,
Emmett,	Lomira,	Rubicon,
Farmersville,	Lowell,	Theresa,
Fox Lake,		Woodland.

Door County.

Chickatock,	Marcus,	Sturgeon Bay,
Fish Creek,	Nasewapee,	Washington Harbor.

Douglass County.

Superior.

Dunn County.

Dunnville,	Fall City,	Rorkville,
Durand,	Frankfort,	Waneka,
Eau Galle,	Pepin,	Waubeck.
	Rock Falls,	

Eau Claire County.

Augusta,	Half Moon,	Otter Creek,

Fond du Lac County.

Alcove,	Fair Water,	Newfane,
Ashford,	Fond du Lac,	North Lamartine,
Auburn,	Foster,	Oakfield
Bothelle,	Hinesberg,	Oakfield Centre,
Brandon,	Junius,	Oceda,
Byron,	Ladoga,	Ripon,
Calumet Village,	Lamartine,	Rosendale,
Dotyville,	Marytown,	Rush Lake,
Eden,	Metomen,	Taycheeda,
El Dorado,	Moria,	Wawpun,
Empire,	Murone,	West Rosendale.
	Nanaupa,	

Grant County.

Banfield,	Hazel Green,	Oliver's Mills,
Beetown,	Homer,	Ora Oak,
Boscobel,	Hurricane Grove,	Patch Grove,
Bunker's Hill,	Jamestown,	Platteville,
Cassville,	*Lancaster*, (c. h.,)	Potosi,
Castle Rock,	Little Grant,	Rockville,
Charlotte,	Martinville,	Saint Rose,
Dickeysville,	Millville,	Sinsinawa Mound,
Ellenboro',	Montford,	Smeltzer's Grove,
Fair Play,	Mount Hope,	Tafton,
Fennimore,	Mount Ida,	Washburn,
Glen Haven,	Muscoda,	Wyalusing.
	New California,	

Green County.

Albany,	Exeter,	Oakley,
Attica,	Farmer's Grove,	Pedee,
Bem,	Hoosick,	Sluey's Mills,
Brodhead,	Jordan,	Skinner,
Brooklyn,	Juda,	Spring Grove,
Cadiz,	*Monroe*, (c. h.,)	Sylvester,
Dayton,	Monticello,	Walnut Springs,
Decatur,	Moorefield,	Willet.
	New Glarus,	

Iowa County.

Adamsville,	Dover,	Mineral Point,
Arena,	Helena,	Moscow,
Avoca,	Highland,	Ridgeway,
Clyde,	Jenoleton,	West Blue Mound,
Dodgeville,	Linden,	Wyoming.
	Mifflin,	

Jackson County.

Black River Falls,	Melrose,	Pole Grove,
Cataract,	Navary,	Roaring Creek,
Garden Valley,	North Bend,	Siscoeit.
	Pine Hill,	

Jefferson County.

Ashipun,	Helenville,	Oakland,
Aztalan,	Ixonia,	Palmyra,
Bark River,	*Jefferson*, (c. h.,)	Richwood,
Cold Spring,	Johnson's Creek,	Rome,
Concord,	Koskonong,	Sullivan,
Farmington,	Make Mills,	Transit,
Fort Atkinson,	Milford,	Waitsville,
Golden Lake,	Oak Hill,	Waterloo,
Hubbleton,		Watertown.

Juneau County.

America,	Lemonweir,	Union Center,
Fowler's Prairie,	Mauston,	Werner.

Kenosha County.

Brighton,	Kenosha,	Salem.
Bristol,	Liberty,	Wheatland,
Cypress,	Marion,	Wilmot.
	Paris,	

Kewaunee County.

Alnapee,	Coryville,	Sandy Bay,
Casco,	Dykesville,	Walhaim.
	Kewaunee,	

La Crosse County.

Bangor,	Half Way Creek,	Neshonoc,
Burns,	La Crosse,	New Amsterdam,
Burr Oak,	Mindoro,	Onalaska.
	Mormon Cooley,	

La Fayette County.

Argyle,	Darlington,	New Diggings,
Belmont,	Elk Grove,	North Elk Grove,
Benton,	Etna,	Shullsburgh,
Bethel Grove,	Fayette,	Spafford,
Blanchardsville,	Georgetown,	White Oak Spring,
Calamine,	Gratiot,	Wiota,
Cottage Inn,	Mecker's Grove,	Yellow Stone.

La Pointe County.

Bayfield,	La Pointe,	Odanah,
Houghton,	Montreal Falls,	Whittlesey.

Manitowoc County.

Branch,	Manitowoc,	Neshoto,
Clark's Mills,	Manitowoc Rapids,	Newtonburgh,
Cooperstown,	Maple Grove,	Niles,
Eaton,	Meeme,	Oslo,
Hika,	Mishicot,	Paquette,
Larrabee,		Two Rivers.

Marathon County.

Geameken,	Mosinee,	*Wausau*, (c. h.,)
Jenny,		Weston.

Marquette County.

Briggsville,	Lake Maria,	Neshkoro,
Dartford,	Long Lake,	Ordino,
Grand Prairie,	Mackford,	Oxford,
Green Lake,	Manchester,	Pakwaukee,
Greenwood,	Markesan,	Princeton,
Harrisville,	Marquette,	Roslin,
Jeddo,	Midland,	Stone Hill,
Kingston,	Montello,	Westfield,
La Cote St. Marie,	Moundville,	West Green Lake.

Milwaukee County.

Butler,	Greenfield,	Oak Creek,
Davis,	Hale's Corners,	Root Creek,
Franklin,	Lamberton,	Ten Mile House,
Good Hope,	Milwaukee,	Wauwatosa,
Granville,	New Berlin,	West Granville.
	New Keoln,	

Monroe County.

Angelo,	Leon,	Ridgeville,
Big Valley,	Meridian,	Solon,
Clifton,	Moore's Creek,	Sparta,
Dorset,	Mountain,	Sultan,
Farmer's Valley,	Mount Pisgah,	Tomah,
Fife,	Oakdale,	Tunnel City,
Glendale,	Pukwana,	Wellington,
Jacksonville,		Wilton.

(To be concluded.)

WATER-WORKS OF AMERICA.

CHICAGO, ILL.

The last annual report of the Board of Public Works of Chicago contains, among other matters, the report of the engineer of the water-works, as well as an interesting record of analysis of the water supplied to the city, by Messrs. Blaney & Mariner, analytical chemists.

The condition of the works is said to be very satisfactory, with the exception of the natural wear and tear incident to the amount of labor to which they have been put.

By the report of the engineer of the pumping-works, it appears that the quantity of water distributed during 1861 was but a trifle more than that pumped in 1860. The amount pumped in 1859 over 1858 was equal to 29¼ per cent., and the quantity pumped in 1860 over 1859 equaled 21¼ per cent., while 1861 exceeded 1860 only about 3 per cent.

The trifling increase of the past year over 1860 may be accounted for to some extent by the fact that in 1860 it was necessary to waste a considerable amount of water at the Engine House, while through the past year the waste in the same quarter has been comparatively small, and since the completion of the new main, the necessity for wasting has been entirely obviated.

The following table will show the quantity of water pumped each month of the last four years:

MONTHS.	1858.	1859.	1860.	1861.
January....	81,538,179	106,905,665	132,284,454	137,651,918
February..	69,426,515	106,401,412	130,800,720	142,071,067
March	82,677,468	102,415,983	150,331,680	135,576,447
April	82,600,782	89,994,295	132,930,546	128,871,178
May	82,279,920	116,107,263	141,171,078	150,489,168
June	90,211,505	113,098,416	148,197,024	155,996,352
July	101,670,736	133,800,336	166,394,640	147,182,796
August	107,176,652	123,266,556	152,427,690	168,602,494
September..	108,534,540	131,735,847	132,272,202	152,710,186
October.....	101,046,605	141,527,040	148,710,195	149,362,166
November ..	86,385,840	127,342,018	150,493,248	153,879,648
December...	98,816,7 2	122,658,139	130,773,075	145,261,272
Totals....	1,091,865,457	1,415,147,910	1,716,786,552	1,767,154,689

It will be seen that 1,767,154,689 gallons have been pumped the past year. Of this amount,

The large engine pumped.....1,072,485,120 galls.
The small " " ..... 694,669,569 "

The engines have been in operation the past year 5,967 hours and 44 minutes, which is an average of 16 21-60 hours of each day throughout the year.

The amount of coal consumed the past year is 2,431 653-2000 tons, which is about 190 tons less than was consumed in 1860. This decrease may be attributed in part to the superior condition of the small engine, resulting from the new steam piston which was attached in the latter part of 1860, also to the benefits derived from the enlarged "main," and perhaps the character of the coal, which, as a general thing, was of better quality than that received in 1860.

Of the foregoing amount of coal 116 1165-2000 tons is due to the necessity of stopping the engines at different times during the day, when the reservoirs are full, it being consumed for the purpose of keeping steam up when the engines are at rest. These stops have occured 607 times the past year, consuming nearly 400 lbs. of coal each time. The limited capacity of the reservoirs makes it necessary to keep fire in the boilers continually, the fires not having been out in nearly eight years.

AVERAGE DAILY CONSUMPTION.

1858....2,991,412 galls.
1859....3,877,910 "
1860....4,703,525 "
1861....4,841,520 "
} 7½ galls. to a cubic foot.

The total length of pipe of all sizes laid during the year was 8,233 feet. The total length of pipe at present in the city, as nearly as can be ascertained, is 503,129 feet, or 95 miles and 1,522 feet.

RESERVOIRS.

The north and west reservoirs are and have been in good order during the past year. The south reservoir leaked so badly in the summer, that it was found necessary to repair it thoroughly before filling it through the new main. This was supposed to be done about the 10th of October, when the reservoir was filled, and new leaks were discovered. It was used for some time, however, but when dampness shows itself through the outside walls, it was determined to make further repairs. These have been completed and the water again

let on. A very great improvement has been made, still a few leaks exist which it will not probably be necessary to repair before spring. The difficulty with this reservoir is owing to the quality of the English iron used, which, it is now very clearly seen, was unsuitable for the purpose. It may be necessary to put in an entirely new botton before making it tight, but it is still hoped that this expense may be avoided for a few years.

The ground around the south reservoir has been enclosed by a substantial picket fence, which has not only greatly improved its appearance, but has added much to its value as a place for keeping water and sewerage pipes. A commencement has been made towards grading it up with street dirt. When this is completed, a good part of it may be sown down in grass and otherwise ornamented at a small expense.

Previous to the completion of the new main, the south reservoir was of very little use, as it was found impossible to get more than a few feet of water in it, and that generally in the night, while during the day it stood most of the time below the bottom of the reservoir. Since the completion of the new main, no difficulty is found in filling this reservoir to overflowing in the day time, especially when the large engine is at work.

QUALITY OF THE WATER.

With the exception of turbidness during and shortly after easterly storms, the quality of the water furnished has generally been very good; but there have been occasional exceptions, the most important of which are owing to three different causes.

First, after a long continuance of snow and ice, a thaw and rain are sure to be followed by an unpleasant smoky taste in the water, lasting from one to two days. This happens seldom more than twice in a winter, and sometimes not more than once.

Second, the "*fish nuisance*," as it has been generally called. This has never been so annoying before as it has been this winter. In December they came in such quantities as to choke up the only screen that was effectual in keeping them out of the pumping-well, and in order to prevent the pumps from sucking air instead of water, it was found necessary to remove this screen, which being in the grooves intended for a stop-gate, could not be cleaned without being taken out, and the very act of taking it out necessarily let all the fish accumulated above it pass through. It was hoped and believed, judging from the experience of previous winters, that the trouble would cease in a shorter time than any thing effectual could be done in at the entrance of the inlet-pipe. At this point three screens had been put in, with conveniences for taking one out at a time to be cleaned, while the others stopped the passage of fish or other substances. But the bottoms of these screens had been undermined, and the protection to the inlet supposed to be otherwise so much injured by the ice, as to render any attempt at effectual repairs hopeless. But as the nuisance continued, and caused the hot water from boilers connected with the works to be peculiarly offensive, and sometimes causing even the cold water to taste, to say nothing of the offensive sight of so many dead and mangled fish coming from the taps in nearly every part of the city, an attempt was made to close up the openings under the screens by means of stones, gravel, and canvas; first building a shanty over the screens to shelter the laborers. Men were then set to watch the screens at the inlet night and day, and the screen that had been taken up near the engine-house was put in its place again. This appeared at the time to be effectual, as the screen near the engine-house did not become foul. In about three days after the work was done, the fish ceased to be troublesome at the inlet. The pipes all over the city were flushed out by means of the fire-hydrants, and the reservoirs thoroughly cleansed. The cold water immediately became free from offensiveness to sight, smell, or taste, and the boilers gradually lost their disagreeable odor. After the citizens had begun to congratulate themselves upon the purity of the water, and that the fish would not trouble them again this season, they reappeared suddenly, though previously undiscovered openings, in great multitudes, and made it necessary to take out the screen near the engine-house. This was very early on the morning of the 7th inst. After being cleansed the screen was put back, but becoming foul again in the afternoon, it was broken in the attempt to take it out. By keeping men day and night at the inlet a great many fish were caught, and a repetition of the nuisance on anything like the former scale was prevented. After three or four days the fish ceased to appear in great numbers. Such means are now in progress of construction as is hoped will prevent their reappearance.

Third, the most serious cause of impurity is believed to be the river. The discharge of the sewers into the river will at once be pointed at as the great cause, and the late Board of Sewerage Commissioners in the plan which they adopted, with the concurrence of the City Council, took the ground that the time would come when the discharge of all the sewerage of the city into the river would make it offensive, and provided a plan for correcting the evil—that of a constant infusion of fresh lake water into the river by means of steam-power.

But while the sewers have undoubtedly had their share—and a very important one too—in corrupting the river, another cause, which did not in 1855, if it does now, legally exist, has tended most powerfully to produce the present state of things; and that is the wholesale discharge of blood, and other refuse from the slaughter and packing-houses, in and around the city, besides distilleries, glue factories, establishments for rendering offal, &c.

It may seem to some idle to attempt to separate the effect of the packing-houses, &c., from that of the sewers, but the following well-known facts will make it clear that the effect of the former can be distinctly traced. Last spring the river became quite effensive in smell, and a committee was appointed by the City Council to confer with the officers of the canal in relation to changing the water in the river by pumping at Bridgeport. It so happened that before any arrangement was made it became necessary to pump to supply the wants of the canal itself, and nothing more was done by the city. During the whole summer and the early part of autumn, the river, though receiving its full amount of sewerage, did not become so offensive at any time as to be a cause of complaint. Very soon, however, after the packing season commenced, a most disagreeable odor was observed near the Old Street Bridge, on the South Branch, which is *above* the outlet of any existing sewer. This peculiar odor could be traced afterwards, as it moved down stream, till it reached the mouth of the river.

As an additional proof that the sewers do not cause all the bad smells, it may be here mentioned that in 1860 the discharge from piggeries and cow-stables high up on the North Branch, made that stream exceedingly offensive to its mouth. It is also very offensive this winter, and yet there is not a single sewer emptying into it at ordinary times, and only two, those on West Kinzie and Fulton streets, that do in times of heavy rains.

Many of the older inhabitants of Chicago no doubt remember that before any sewers were built, and when the packing business was in its infancy compared with its present state, the river became so offensive from the discharge of blood and other refuse into it, as to lead to the passage of a city ordinance forbidding it.

Another reason can be given for the excessively offensive state of the river this winter, as compared with what it was last summer. It is well known that water will become purified from offensive organic matter by simply letting it stand in contact with the air a sufficiently long time; hence the more rapidly it can be brought into contact with the air, the more rapidly it becomes purified. Now, during the summer the surface of the river was not only uncovered, but frequently agitated by the passage of tugs and other vessels, which tended powerfully to purify it. But during much of the winter the surface of the river has been covered with ice, and consequently the air has been almost entirely excluded from it. It has been like a bottle with two mouths, which, originally filled with comparatively pure water, but receiving only continual accessions of filth into one mouth, soon ceases to discharge anything but filth from the other.

The late Board of Water Commissioners directed their attention to the complaints of injury to the water pumped up for the city "from the wash of the lake shore and the flow of the river," and caused surveys and estimates to be made and plans to be discussed. By reference to their report of Jan. 1st, 1861, p. 28 to 44, it will be seen that five plans were estimated for. These are:

1st, Extending a pipe a mile out into the lake.
2d, Making a tunnel the same distance.
3d, Removing the pumping-works to Winetka.
4th, Constructing filter-beds.
5th, Constructing a subsiding reservoir.

None of these plans were recommended for immediate adoption, but it was thought best to wait another season, and test by chemical analyses whether the effect of the river as far up as the pumping-works was really appreciable or only imaginary. These analyses have been made with great care and labor by Drs. Blaney & Mariner.

Neither of the plans above mentioned could be made available for present relief, and it is yet uncertain which, upon the whole, it would be best to adopt. That of removing the pumping-works to Winetka (or perhaps to a point a few miles nearer—say nine or ten miles north of the city)—would undoubtedly give entire freedom from the effects of the river and the wash of the city shore, but its cost would be so great as to make it advisible, if not absolutely necessary, in the present state of the city's finances, to inquire if such an outlay cannot be avoided.

The late Board of Sewerage Commissioners not only embraced in their original plan a method of preventing the river from becoming offensive from sewerage, which the result of pumping at Bridgeport proves would be effectual, but kept the subject continually in mind, as their late published reports will show. In June 1860, it was recommended to make an arrangement with the Canal Board to keep their pumps in operation so much of the time during six months of the year as might be necessary to preserve the river from smelling bad, though the wants of the canal might not require it. The experience of the past winter shows that such an arrangement should be extended so as to embrace occasional pumping in winter, if practicable then, as well as in summer.

The above plan was not recommended as a permanent one, but simply as the most advisable expedient for a few years to come, giving time to settle several important questions relative to the future of Chicago, before adopting a more permanent, thorough, and necessarily costly plan. The questions alluded to are the probable growth of Chicago, the direction of that growth, the harbor improvements that may be adopted, the construction of the proposed ship canal to the Illinois River, and the necessity or expediency of imitating the great sewerage intercepting scheme of London, now being carried out. The light which a few years will throw on these questions would be of immense advantage to Chicago, in the planning of permanent works to remove the evils now complained of.

The theories confirmed by the analyses of Drs. Blaney & Mariner,* are not only the one that the water of the lake is the purer the further you take it from the shore, but the one that impurities are greater, within the city limits, south of the river, than at a much less distance north. Perhaps a larger number of analyses might modify the latter statement somewhat. The fact that on the 17th of April last, water taken from the river at Clark street bridge was purer than that taken from the lake, opposite Cleaverville and one thousand feet from the shore, is certainly very striking, and shows how great an effect the rains of spring have on the river. In November and now, not only analyses but our senses show a very different state of things.

One theory corrected is that there is less organic matter in the lake water, say not more than a mile from the shore, than there is in that furnished to New York, Philadelphia, and Baltimore; there is in reality more. It is also greater than that supplied by the London Water Companies in 1856. Another theory a non-professional person is apt to hold is that the offensive water taken from "dead-ends" in the city pipes contains a greater amount of impurities than that which is not offensive and taken from pipes having a free circulation; but analysis shows less organic matter, the offensiveness being due, not to its quantity, but to the

* We have not space to publish the report of Drs. Blaney & Mariner in this number, but will publish it in our next.

change it is undergoing. The actual diminution of organic matter is supposed to be owing to the action of the iron pipes.

Another striking peculiarity of the lake-water is the large amount of silica it contains, and to this is owing its peculiar effect upon boilers, besides that which the lime it contains is known to exert. The river-water also contains very large proportions of it at times.

In concluding this article on the quality of the water, what has been said may be thus summed up:

1st. The smoky taste occurs so seldom as not to be a serious matter.

2d. The fish-nuisance can and no doubt will be entirely prevented before next winter.

3d. The very disagreeable taste and smell occuring at three different times during the last two weeks, and lasting two to three days each time, evidently proceeded from the river.

4th. The offensive state of the river this winter, is due very largely to the great quantity of blood and other refuse discharged into it from packing-houses, distilleries, &c.

5th. Pumping at Bridgeport would bring the speediest, and would be the most economical temporary relief.

6th. It is exceedingly desirable to postpone the adoption of very expensive permanent pla s a few years, till more light can be obtained on the several questions before mentioned.

7th. The analysis shows, what was known to chemists before, that an offensive taste and smell in water, is owing not so much to the quantity of organic matter present, as it is to its condition of life or decay.

8th. Natural relief may be expected soon from the thaws and rains of spring, which must change the character of the water in the river.

METERS.

There are now in use in the whole city 10 Meters. They are all of the Worthington Patent, and of the following sizes, viz:

2—⅝ inch.
5—1 inch.
2—2 inch.
1—3 inch.

Wherever it has been thought best to introduce them, and they have been kept in order a sufficiently long time, they have more than paid for themselves by the increased rates they showed should be charged. In a few instances they have been prevented from working by grit and sand in the water. A contrivance for preventing this is now under trial, and if it should succeed, as we hope it will, we can attach meters again to some of the largest hotels where they failed before, and where it is very desirable to have them.

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THE WATER-SUPPLY OF PHILADELPHIA.

[From the *United States Railroad and Mining Register.*]

MR. EDITOR,—In my communication of last week, I stated the pregnant fact that the Schuylkill Navigation Company had notified the authorities of Philadelphia that they were using water for the purpose of supplying the city, which water was required by them for navigation purposes, and to which that company had a prior right legally settled. I also said that this was no time to make new drafts upon the Schuylkill, as that source was thus proved to have *given out.*

In the face of this state of things, the citizens of Philadelphia are called upon to spend another nine hundred thousand dollars to get more water from this exausted resource, whilst the Delaware river, capable ot supplying ten Babylons, is running by their doors unused, except at one point where a large sewer enters that stream, the foul water from which is pumped up into the reservoir. Now, let us see what can be done with the Delaware.

On the right bank of the Delaware, from where the Frankford Creek enters it, for a distance of several miles up stream, there will be found long stretches of clean gravel strands, entirely free from alluvial sediments. This is a remarkable phenomenon upon the bank of a stream which brings down so much alluvion from the upper country. It is so remarkable that there must be some active cause to prevent the sediment. Several causes might be suggested, but only a close hydrographical study of the regimen of the Delaware is likely to divine the true one. It is sufficient for us, at the present moment, to know that there is no alluvial deposit going on along these gravel banks; and, as there is such a deposit progressing constantly along almost all the other shores of the Delaware, then there must be a permanently acting cause which keeps the water along these shores, in the locality referred to, almost entirely clear.

The tide runs up and down along these shores, and alluvion of course passes with it. Sewage alluvion enters the Delaware in large quantities where the city is more densely populated, and this might be supposed to have some influence upon the water. But it must be remembered that the preventing cause acts upon the tide, whether it ebbs or flows, for there is never any sediment at our gravel banks; and, besides, they are so far removed—say twelve miles at the least—that sewage, in its chemical and intangible characteristics, cannot possibly have any influence upon it. The sewage that enters the Delaware between, say, the Navy Yard and Richmond, can never affect the water so far up as the vicinage of which I speak.

By the time it would reach there, there would be nothing left of it except, perhaps, some insoluble floating fibre, become entirely innocuous, which, mechanically affected by the causes which prevent earthy alluvion from settling there, would equally effect this floating fibre from precipitation.

It has been ascertained, by the closest chemical scrutiny, that when sewage liquid from a large town enters a mass of pure water of three hundred times its own volume, a chemical purifying process immediately ensues, which acts with surprising rapidity, and in a scarcely assignable short time the corrupt and the uncorrupt becomes one homogeneous fluid—in fact, return to the purity of the larger mass, the state of the river water.*

Now if, instead of there being only six hundred thousand inhabitants in Philadelphia, there were six millions of inhabitants, it is surely not necessary to go into a calculation to prove that these six millions would produce sewage to the amount of one-three-hundreths of the mass of water flowing past their wharves in the Delaware river. When, then, Philadelphia shall have become twice as populous as London is now, the danger of their fouling the Delaware river so as to affect its waters at a point twelve or fifteen miles above Market street, will still be at as incalculable a distance off as it is at this moment.

You can, therefore, get pure Delaware water along these gravel shores in any quantity, and for an indefinite period of time. And, as stated in my first communication, Delaware water is esteemed by seagoing men (an admirable testimonial by the way) as equal, at least, to that procurable at any other seaport in the world.

The next thing to be considered is—how are you to get it? There can be nothing more simple. Let a commission of honest and intelligent men be raised by law whose duty it shall be to supply the city of Philadelphia permanently with pure water—and give them the requisite powers and means—and when they shall have finished their work, let them hand it over to the city authorities. I suggest this because—for the regularly constituted authorities of a town like Philadelphia to undertake such a thing, as times go, would be absolutely absurd. The Delaware, nay the Atlantic Ocean, would dry up and its bottom be flying in our faces in the form of dust, before our Councils could agree upon the first form of a plan. Such a commission as I speak of, if honest and capable, (it should not consist of more than three,) would seek for the best engineering talent to be found; an examination of the ground would be made; a set of powerful pumping engines would be erected somewhere in the region of which I speak. The water would be thrown into a previously constructed reservoir of ample size, say one hundred and fifty or two hundred and fifty acres in extent, and fifty feet deep, dyked off upon the first sufficiently elevated ground existing back of our gravelly shores.

No consequence if you have to go back five miles, or ten for that matter. Certain it is that back of these shores, in the fork of the Delaware and Schuylkill, such elevation exists; and, as I said before, you could supply Philadelphia thus were she increased to the size of ten Babylons.

All this could be done for ten millions of dollars—nay, *less.* A system worth two of the New York systems could be arranged for Philadelphia at one-half the cost to which the New Yorkers have been put.

Will the Philadelphians go on in their good easy way, submitting to nine hundred thousand after nine hundred thousand annually in cost—for drawing upon a water deposit where there is no water—so we are informed legally by our prior-right-men, the Schuylkill navvies? or will they erect a system unequalled in modern times, both in efficiency and cheapness?

September 30, 1862. AQUARIUS ENGINEER.

* See Dr. Letheby's experiments upon the Thames water. *Proceedings of the Metropolitan Board, London*, 1853

THE COLOR PRODUCTS OF COAL—MAUVE AND MAGENTA.

A Lecture delivered before the Royal Institution of England.

BY A. W. HOFFMANN, L. L. D., F. R. S.

The fact of the beautiful coloring matters known by these fanciful terms, mauve and magenta, being substances derived from coal, must, I presume, be familiar to every one of you. But there may be many unacquainted with the means by which this transformation is accomplished. It is to them that I address myself.

Coal to become color, has to pass through a series of stages of transition, each of which claims our attention for a moment. Briefly expressed, the aim of this address may be said to be, to show you the way from coal to color.

Color is intimately associated with light: without light there is no color. This remark applies in a double sense to the colors derived from coal; for it is to the introduction of gas-light for illuminating our streets and houses, that we are indebted for the acquisition of these colors. This statement may appear strange, for nearly half a century has elapsed during which we have been in the possession of gas, whilst the transformation of coal into coloring matters has been achieved only recently under our own eyes. But you will immediately appreciate the truth of my assertion if I tell you that these substances are obtained from a secondary product, generated in the manufacture of gas, a product long used for a variety of purposes, but which, only within the last few years, the researches of chemists have proved to be an inexhaustible mine of wealth and interest.

The starting point, then, for the production of mauve and magenta, is the manufacture of coal-gas; but this is so well know as not to need any detailed description. Let me briefly remind you of the principal features of the distillation of coal, by directing your attention to the two large diagrams representing the retort house and the condensers of a gas-works. You observe how the coal is heated in stupendous retorts, five or seven of which are generally associated in one furnace. The gas ascends from these retorts in vertical tubes, the bent ends of which dip into a large horizontal pipe, partly filled with water, called the hydraulic main, a considerable amount of the oily and tarry substances generated with the gas being separated by the water. The gas, so far purified, passes on through the condensers—immense vertical iron pipes constantly cooled by a current of cold water which surrounds their external surface. In these condensers an additional quantity of oily matter is separated, which, together with the oily substances deposited by the gas during its passage through the hydrrulic main, is collected in appropriately-placed cisterns. The gas, having traversed the condensers, passes through a series of further purifications before it is delivered into the mains of our streets; but these, unconnected as they are with our subject, must no longer occupy our attention.

It is in the oily products, the so-called coal-tar oil, that our interest is centered. To my mind, this coal-tar oil is one of the most wonderful productions in the whole range of chemistry. That may be rather a one-

sided view, but having in younger years spent much time in the investigation of this substance, I have acquired quite an affection for it. Nor can you fail to appreciate the interest which coal-tar presents to the chemist when you look at the diagram in which I have endeavored to arrange synoptically the various substances which have been eliminated from it.

PRODUCTS OF THE DESTRUCTIVE DISTILLATION OF COAL.

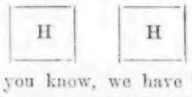
Name.	Formula.	Boiling Points. Degrees.
Hydrogen	H H	
Marsh gas, or hydride of methyl	C H_3, H	
Hydride of hexyl	C_6 H_{13}, H	
Hydride of octyl	C_8 H_{17}, H	
Hydride of decyl	C_{10} H_{21}, H	
Olefiant gas, or ethylene	C_2 H_4	
Propylene or tetrylene	C_3 H_6	
Caproylene or hexylene	C_6 H_{12}	55
Œnanthylene or heptylene	C_7 H_{14}	
Paraffine	C_n H_{2n}(?)	
Acetylene	C_2 H_2	
Benzole	C_6 H_6	84
Parabenzole	C_6 H_6	
Toluol	C_7 H_8	114
Xylol	C_8 H_{10}	126
Cymol	$C_{10}H_{14}$	175
Cumol	C_9H_{12}	150
Naphthalin	$C_{12}H_8$	212
Paranaphthalin or anthracen	$C_{14}H_{10}$	
Chrysen	$C_{12}H_4$(?)	
Pyren	$C_{30}H_4$	
Eupion	(?)	
Water	H, H } O	100
Hydrosulphuric acid	H, H } S	
Hydrosulpocyanic acid	H, (CN) } S	
Carbonic oxide	CO	
Carbonic anhydride	CO_2	
Disulphide of carbon	CS	
Sulphurous anhydride	SO_2	
Acetic acid	H, (C_2H_3O) } O	120
Phenylic acid or alcohol, *phenol*	H, (C_6H_5) } O	188
Cresylic acid or alcohol, cresol	H, (C_7H_7) } O	203
Phlorylic acid or alcohol, phlorol	H, (C_8H_9) } O	
Rosolic acid		
Brunolic acid	(?)	
Ammonia	H, H, H } N	
Aniline	C_6H_5, H, H } N	182
Cespitine	(C_5 H_{13})‴N	96
Pyridine	(C_5 H_5)‴N	115
Picoline	(C_6 H_7)‴N	134
Lutidine	(C_7 H_9)‴N	154
Collidine	(C_8 H_{11})‴N	170
Parvoline	(C_9 H_{13})‴N	188
Carodine	($C_{10}H_{15}$)‴N	211
Rubidine	($C_{11}H_{17}$)‴N	230
Viridine	($C_{12}H_{19}$)‴N	251
Chinoline or leucoline	C_9 H_7 N	235
Lepidine	$C_{10}H_9$ N	260
Crytidine	$C_{11}H_{11}N$	
Pyrroll	C_4 H_5 N(?)	
Hydrocyanic acid	H C N	

This is rather a formidable list of compounds; their names, too, are not always remarkable for smoothness and melodious character, although I should not omit to state they are tame and domestic when compared with some of the terms which chemists of late have been under the painful necessity of inventing and inflicting. You need not be afraid, however, that I shall trouble you with many details about these substances. Most of them, though highly interesting for more than one reason, more especially when considered from a purely scientific point of view, are of no importance for our present subject, and need not therefore specially be noticed. In fact, the only coal derivatives which, in connection with mauve and magenta, claim our attention, are benzole, phenol, and aniline; those certainly we must by-and-by examine somewhat more in detail.

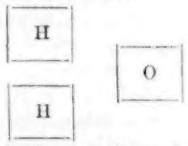
But before doing so, you legitimately expect that I should endeavor to give you some idea of the nature of the process in which this endless variety of compounds is generated from coal. Were I to tell you simply that coal consists of carbon, hydrogen, nitrogen, oxygen, and sulphur, not to mention the ash which is left after combustion, and that you may therefore look upon coal as a sort of magazine of these several elements, capable, under the influence of heat, of associating in an infinity of forms and proportions, you would have learnt comparatively little. Let me attempt to convey to you a somewhat more precise idea of the processes involved in the distillation of coal. For this purpose you must allow me to remind you of some of the general results elaborated by the researches of chemists during the last ten years, which at the first glance appear but little connected with mauve and magenta.

The infinite number of substances, mineral, vegetable, or animal, which form our planet, variously as they are composed, may be referred—chemists now pretty generally agree—to a comparatively small number of types of construction. Opinions are divided respecting the actual number of these types, and even the choice of typical bodies is still a subject of discussion among chemists. But whatever the special views of particular schools may be, the number of types is always small, and among them almost invariably figure hydrogen, water, and ammonia. The comprehension of the meaning attached by chemists to the term "types" may perhaps be facilitated to you by a glance at three models which I have had constructed for this purpose, and which, for the sake of convenience, I may be allowed to designate as type moulds.

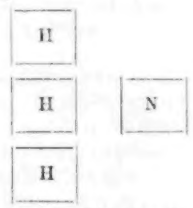
Chemists assume that the smallest particle of hydrogen which exists in the free state, or, to use the chemical phrase, the molecule of hydrogen, consists of two atoms of hydrogen. The first of our type moulds, then, charged as it is with one atom (one volume) of hydrogen, associated with another atom (one volume) of hydrogen, represents the molecule of hydrogen.



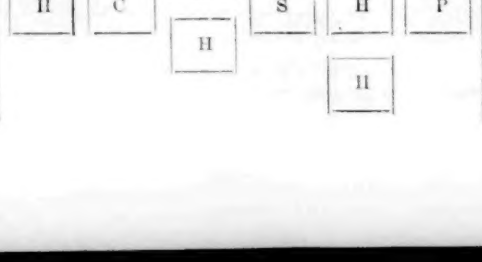
In water, as you know, we have two atoms (two volumes) of hydrogen, associated with one atom (one volume) of oxygen. (Equivalents used: H=1; O=16; S=32; C=12; N=14; Cl=33.5, &c.) You are reminded of this fact by our second type mould which represents the molecule of water.



In ammonia, lastly, you have three atoms (three volumes) of hydrogen united with one atom (one volume) of nitrogen, a form of construction which is recorded in our third type mould representing the molecule of ammonia.



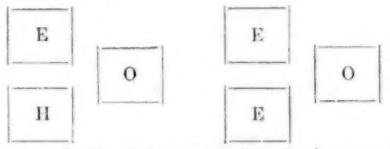
Nothing is easier now than to trace the derivation of other substances from hydrogen, from water, from ammonia. Let me remove from our three type moulds one atom respectively of hydrogen, oxygen, and nitrogen, and fill the places thus vacated with atoms of chlorine, sulphur, and phosporous, and I have, without giving you the slightest inconvenience, converted hydrogen into hydrochloric acid, water into sulphuretted, and ammonia into phosphorated hydrogen.



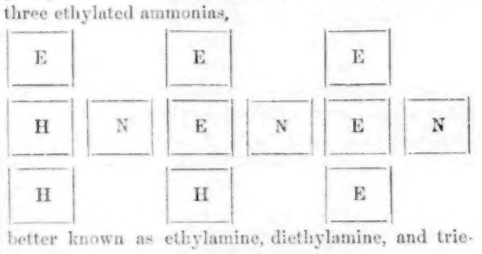
You observe the molecules of hydrochloric acid, of sulphuretted and of phosphorated hydrogen respectively contain the same number of atoms which are present in the molecule of hydrogen, of water, and of ammonia. We have thus indicated that hydrochloric acid is constructed upon the hydrogen type, sulphuretted hydrogen upon the water type, phosphorated hydrogen, lastly, upon the type of ammonia. The three bodies just considered were formed by the insertion of elementary atoms; but our type moulds receive compound atoms with the same facility.

Let me take as an illustration the compound atom, ethyl, consisting of two atoms of carbon and five of hydrogen (C_2H_5=E), which is familiar to the members of the Royal Institution. By inserting one or two ethyl atoms into the hydrogen mould I generate the molecules of ethylated hydrogen, or ethlated ethyl (free ethyl).

In a similar manner, by introducing either one or two ethyl atoms into water, I convert the molecule of water into the molecules of the two ethylated waters, alcohol and ether.

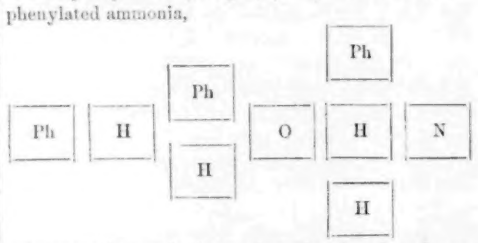


Displace, lastly, one, two, or three hydrogen atoms in ammonia, by one, two, or three ethyl atoms, and you give rise to the formation of the molecules of the three ethylated ammonias,



better known as ethylamine, diethylamine, and triethylamine.

At the risk of exhausting your patience, I repeat some of these changes with another compound atom of a composition differing from that of ethyl. These mauve-colored cubes may represent a compound atom, containing six atoms of carbon and five of hydrogen (C_6H_5=Ph), to which chemists have given the name of "phenyl." Charge each of our type moulds with an atom of phenyl, and you accomplish the construction of phenylated hydrogen, phenylated water, and phenylated ammonia,



substances known better as benzole, phenol, and analine; and the existence of which in coal-tar oil I have already pointed out to you.

(To be continued.)

MANUFACTURE OF COKE.—An invention of some importance, inasmuch as it will permit of the utilization of a large amount of slack, has just been patented by Mr. T. Ramsay, of Newcastle-on-Tyne, England. The coal instead of being coked as it comes from the pit is first crushed almost as fine as flour, either between rollers under edge runners or otherwise. This coal powder is then placed in an oven in the usual manner, and the coking proceeds precisely in the same way as if the large coal were used. Mr. Ramsay finds that by this process he obtains a much denser and more compact coke than usual, and that there is less breeze. Any small quantity of breeze, however, that may be made is recrushed with fresh coal, and coked again.

HIGH PRICE OF COAL.—Anthracite coal is now retailing in this city at $7.50 per ton. Only three months ago it could have been bought for $4.50 per ton.

PETROLEUM ITEMS.

ORIGIN OF PETROLEUM.—Professor Hind, in the *Journal of the Board of Arts for Upper Canada*, thus speaks of the origin of petroleum and the cause of the decline in the yield of the Pennsylvania oil wells:

The cause of the decline in the yield of the Pennsylvania wells is very probably due to the exhaustion of the gas which forced up the oil to the surface. We do not agree with the "uncertainties" spoken of by the Committee of the Canadian Oil Association which precedes this notice. Petroleum is neither derived from coal, nor is it of recent origin. It was formed long before the coal, and is the result of the decomposition, under pressure, of an infinite number of oil-yielding animals which swarmed in the seas of the Devonian period, long anterior to the coal. The decomposition of marine plants may have given some oil to the rocks of Canada and the United States, which are saturated with this curious substance. The shale beds of Collingwood furnish an answer to those who object to the infinite number of animals it would require to produce the oil locked up in the earth. Those shale beds are composed almost altogether of the remains of Trilobites—they extend from Lake Huron to Lake Ontario, and far west and east of those lakes. The oil-bearing rocks of Canada were once a vast coral reef, extending from the Gulf of Mexico to Lake Superior. There is the best ground for belief that the supply of oil will last for a long period, and that new discoveries will be made in different localities. But as soon as the motive power which forces the oil to the surface is exhausted by finding free access to the air, recourse must be had to pumping, and the sinking of the necessary deep wells, will soon throw out all those owners of wells who are not possessed of capital. Deep shafts will eventually have to be sunk, and the oil will continue for a very long period to flow into the wells, but the cost of pumping will be so small that the price of oil may not rise much beyond its present market value. That value will be, of course, determined by the cheapness of other illuminators, and as the supply will doubtless be ample, we do not anticipate any considerable rise in price. The London Company have made purchases of land, we understand, in different parts of the peninsula, but it does not appear that these purchases have been made with a knowledge of the geological formation of the country or of the distribution of the *accumulations* of oil The area of oil or petroleum yielding rock is very great in Western Canada, extending over the whole region occupied by the Corniferous limestone, but the fissures in which the oil has accumulated, are probably found only in the main and subordinate anticlinal axes which run through the western peninsula. If the land purchasers for the company have not had this remarkable geological peculiarity prominently and constantly before them, in vain are their purchases of "oil lands;" they may have secured good farm lots as the country settles up, but when they come to bore for oil, the returns for their labor may be chiefly couched in the words *non est inventus.*

EXPENSES ON PETROLEUM IN NEW YORK CITY.—Gwyer's circular gives the following account of expenses on petroleum in New York:

I have frequent inquiries addressed to me, asking information as to the usual cost and charges on oil in our market. For the benefit of inquirers, and to place the facts more prominently before refiners throughout the country, I subjoin a tariff of prices usually incurred on oil in Valentine's storage yard, Jersey City.

Storage on oil, crude or refined, per month....	6	cents per barrel.
Cooperage " ".....	7	" "
Gauging and bunging refined	8	" "
Gauging, bunging and searching crude.....10		" "
Storage on Benzine, per month.....16		" "
Delivery to end of pier.....	5	" "
Lighterage to vessel.....	8	" "

Insurance one per cent. on value.

Remarks.—The *storage* is six cents per barrel for the fractional part of a month, even one day is charged as a month. *Cooperage* is increased if the barrels are in bad order, and require extra work. When goods are sold to be put in shipping order, *there is extra work*, the barrels are regulated to *one gallon*, out, bungs tinned, heads painted and branded; this is charged for under the head of extra cooperage or labor.

When goods are sold, *deliverable in yard*, there is no expense for delivery.

When sold delivered to lighter, it is five cents per barrel; if delivered free on board of vessel, it costs thirteen cents per barrel.

The expenses of storage at other yards is eight cents per barrel per month, or less.

There is no possible way of avoiding these expenses; to transact the business at all, they must be incurred.

Wharf property is very valuable, and the use of it must be paid for. The cooperage is a necessary adjunct of the business, and gauging is indispensable, any work or labor performed must be charged to the goods. It is my purpose to make these charges as light as possible. If my business becomes sufficiently extensive to warrant the risk, I will have my own yard, and reduce these charges if it is practicable to do so.

In all other yards in New York and vicinity the expenses the first month is twelve cents per barrel, which includes reception and delivery from yard.

PETROLEUM TRANSPORTED OVER THE PHILADELPHIA AND ERIE RAILROAD IN AUGUST.—The *United States Railroad and Mining Register* gives the following statement of the amount of petroleum transported over the Philadelphia and Erie Railroad during the month of August, 1862:

1st week, Erie.....	1,227	
Corry.....	3,237—4,464	barrels.
2d week, Erie.....	1,792	
Corry.....	3,101—4,896	barrels.
3d week, Erie.....	2,874	
Corry	1,644—4,518	barrels.
4th week, Erie	2,707	
Corry.....	3,838—6,545	barrels.
	20,423	barrels.
Total received at Erie...	8,600	
" " Corry.....	11,823—20,423	barrels.

COMBUSTIBILITY OF PETROLEUM.—On page 103 of our last issue will be found an item giving an account of some experiments tried in Liverpool, England, to determine the explosiveness and combustibility of petroleum. Referring to these experiments, Dr. Angus Smith, the well-known chemist, writes as follows to the Manchester *Examiner and Times*:

"The experiments at Liverpool on this subject, spoken of by you last week, are, no doubt, very valuable, as a portion of a number to be made, but, if taken by themselves, they seem to establish nothing. You did not inform us of the evaporating point of the oils, and we do not, therefore, know definitely on what substances the experiments were made. If the oil burnt on the cold ground, it must have been a very dangerous specimen. The absence of very violent explosion is not remarkable. Explosion takes place when the vapor is mixed with air, and this occurs chiefly when there is evaporation in an enclosed space. Experiments made in the open air do not necessarily cause explosions. The two great facts to be remembered respecting the volatile petroleum are: 1. That the vapor rising at the ordinary temperatures ignites readily, and when mixed with air explodes. It mixes with air like gas, and in this lies its hidden danger. 2. When water is thrown on the oil, the oil floats on the water, and still burns; whereas spirits mix with water, become diluted, and cease to burn. Having made many trials of these oils, I thought it well to guard against some of the conclusions drawn from the experiments alluded to.—R. ANGUS SMITH."

PETROLEUM FOR EUROPE.—The Portland *Price Current* says, the large whale ship *Omega* is about to load petroleum at that city for Europe. There has been exported from that port since January 1st to the 20th of September, 87,200 gallons of petroleum, and from the United States during the same time, 6,242,912 gallons.

THE OIL MARKET.—The business in petroleum has not of late been very active. A late number of the Oil City *Register* says:

There don't seem to be much eagerness among shippers to get their oil forward, under the existing state of the market. Oil is selling at from 70 to 80 cents at the wells. We hear of sales at this point of some 2,000 barrels at $1. The Woodford well, on the Tarr farm, has started up again, and we are informed is flowing about 400 bbls. per day. A considerable amount of oil has changed hands along the creek since our last, but most of it will be stored at this point until navigation is resumed. Our latest Pittsburg advices quote crude at 6½ to 7 cents; refined 25 cents. The market closes inactive. New barrels are selling at $1 90 to $2. Freights to Pittsburg 80 cents; to Irvine same. The eastern markets are dull and inactive. The European advices are more favorable for us than they have yet been. Teaming unchanged, from 15 to 35 cents per barrel, according to distance.

CANADA OIL WELLS.—The Oil Springs *Chronicle* notices the striking of a new well on September 8th, by Mr. Thos. H. McLean, from which flows the extraordinary quantity of 4,000 barrels of oil per day. Mr. McLean has very properly called this mammoth well the "Leviathan."

FAILING OIL WELLS RESUSCITATED.—Curiously enough several of the largest flowing wells from which large quantities of oil have been taken lately, the fore part of the week showed signs of failing, in one or two instances refusing to flow more than a small stream, but upon raising the pipes and putting down the sand-pumps the cause of apprehension was found to be an accumulation of sediment, small stones and the like, occasioned undoubtedly by the sudden rush of oil upon turning it on and the reaction taken place in suddenly shutting it off again. These obstructions being removed, and the pipes and seed bag put down again, the oil poured out as freely as before. Such has been the case with Mr. Allen's and Murdoch & McColl's wells, which gentlemen, we are happy to say, with trifling expense, have been relieved of much unpleasant apprehension. Yesterday afternoon a stream of oil like a small brook was running away from Mr. Allen's, before the pipe was put down. Other wells reported as failing are, B. Chandler's (just sold). J. H. Bennett & Co.'s, Fairbanks & Co.'s, and H. F. Leavenworth's, all flowing wells. Hopes are entertained that all will be recovered similarly.

GAS-COAL IN AUSTRALIA.—There are several important mines of coal in Australia, some of which are well adapted for gas-making. Mr. Abel, chemist to the British War Department, examined some of this coal, and although containing a somewhat excessive amount of sulphur, his opinion of it was favorable. The following is his report:

"The coal was found to contain a very considerable admixture of shale. Very thin seams of iron pyrites were observed to be interspersed through the massive portions of the coal itself.

"An average sample of the coal as supplied was prepared and the following points determined with it:

"1. The quantity of volatile matter furnished by the coal amounted to 71 per cent., and 29 per cent. of a light and very porous coke was obtained. The coal is, therefore, of a highly bituminous character, and would probably be found excellently adapted for the manufacture of gas.

"2. The percentage of ash contained in this average sample of coal amounted to 6.8 per cent. The ash was of a red brown color, due to the oxide iron produced from the pyrites in the coal.

"A massive piece of the coal was selected for a special determination of the ash, and was found to furnish 4.09 per cent.

"The coal therefore yields, even when free from shale, a quantity of ash unusually large for a bituminous coal.

"3. The percentage of sulphur found in the average sample amounted to 1.11, a quantity slightly exceeding that usually found in Newcastle coal, but which cannot be looked upon as considerable when compared with the large amount of ash furnished by this coal.

"It would appear from the chemical examination of this coal that it is adapted for ordinary purposes, and for the manufacture of gas; but it will not be found equal in value to the description of coal especially employed for steam purposes."

BURNING OF A LIGHTHOUSE.—The lighthouse at Port Dalhousie, on Lake Ontario, in Canada West, took fire on the morning of Wednesday, October 8th, and was so badly damaged as to render it unfit for use.

BROOKLINE, MASS.—This company have reduced the price of their gas, from $4.00 to $3.10 per thousand cubic feet.

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is the recognized official organ of

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PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

WEDNESDAY, OCTOBER 15, 1862.

On another page of this number of the Journal will be found an able criticism by Robert G. Courtenay, Esq., President of the Louisville, Ky., Gas-Light Company, on the decision of the Supreme Court of the State of Wisconsin in the case of Sidney Shepherd *vs.* The Milwaukee Gas-Light Company. The opinion of the Court we published in full on page 106 of our last issue, and as it bears upon a subject of great importance to gas-light companies generally, it is worth a careful perusal. If this decision be regarded as a precedent to be followed in all cases where applicants for the use of gas may exhibit a stubborn disposition and refuse to sign such an agreement as the gas companies see fit to require of them, it is time the fact were generally known, so that means may be taken by the companies to protect themselves, or to so amend the rules as to make them read more in accordance with the ideas of propriety entertained by the learned Judge. The rules which have been adopted by all the gas companies in this country are essentially the same as those objected to in this decision of the Court. There may be slight differences between some of the provisions of different companies, but these are on immaterial points and influenced solely by local questions. The history of these rules may be briefly told. In January, 1834, Mr. Samuel V. Merrick was sent by the city of Philadelphia to visit Europe for the purpose of examining gas-works, with a view of adopting the most approved plans for the construction of works in that city. Mr. Merrick made a careful examination of the principal works then in operation in Great Britain, as well as those in Paris, Brussels, and Ghent. On his return from his tour of observation he wrote a report of his labors, which was presented to the Councils of Philadelphia, December 11th, 1835, accompanied by a copy of the "rules" adopted by the gas-works in England; and as all the continental works he visited were at that time under English control the same rules were in force in those places. In February, 1836, the Philadelphia gas-works were completed, and these rules were adopted by the trustees, where they have been binding ever since. All the gas companies in the country have since then been guided by the same regulations, and now, after an interval of more than 28 years, they are pronounced by one of the highest judicatories in the land to be illegal and unreasonable.

Mr. Courtenay's analysis of the opinion presents many points of interest, and the arguments he uses to sustain his views have been constructed upon strong foundations, as is attested by the references made to cases somewhat analagous to the question at issue. The length of time, during which consumers have willingly acquiesced in the requirements demanded of them by gas companies, certainly suggests the "existence of an immemorial custom or prescription," and although the Milwaukee Gas Company could not show a "proof of a regular usage for twenty years," for the reason that the act of their incorporation does not date back that far, yet, as the rules are the same as those adopted by the oldest companies in the country, they have been complied with in other localities long enough to entitle them to be regarded as agreeing with the idea of the term "immemorial custom" used by Blackstone.

This decision of the Supreme Court of Wisconsin—the first of any great importance affecting the cherished rights of gas companies—may be but the precursor of other cases of similar origin. There are many consumers who are perverse enough in their dispositions to take advantage of the opinion merely for the purpose of fomenting a disturbance, and of achieving the notoriety which would be attained by the plaintiff. In the case in question, the plaintiff, an obscure individual, has been lifted into a position somewhat conspicuous, and has earned for himself the distinction of having his name quoted in connection with a legal point of some importance. He is not alone in his glory. Like the poor negro Dred Scott, and others owing their fame to legal quibbles, he will find his name quoted in briefs and points; but while that of the African will be connected with the idea of personal freedom, the name of the other will stand as an evidence of petty spite.

Gas consumers in this city have long been hoping for the completion of the Metropolitan Gas-Light Company's works, thinking that the vigorous competition which seemed imminent, would bring the other gas companies to a sense of their duty. It is known that at the time the Metropolitan Company was chartered, the old companies regarded the new corporation in the light of an unwelcome intruder. Consumers, however, looked upon the prospect of having an opposition gas company as a consummation devoutly to be hoped for; and when the first piles were driven on the magnificent lot of the Metropolitan company, some began to dilate upon the relief from imposition which the inauguration of the new company would promise. These hopeful individuals will look somewhat aghast on learning that a virtual amalgamation of the Manhattan and Metropolitan companies has taken place, and these two corporations which but a short time ago seemed determined to wage a bitter war upon each other, have, after the lapse of a few months, determined to smoke the calumet of peace, and to make a division of the territory between the boundaries of the New York and Harlem companies. The Metropolitan company have bought the new works lately erected at Sixty-sixth street, which have already cost some $300,000. The district of the new company is to extend from Thirty-fourth street to Harlem, while the Manhattan agree to confine themselves to the district from Grand street to Thirty-fourth. The latter company take a considerable amount of stock in the Metropolitan, and thus settle the differences which existed between the rival concerns. The Metropolitan Company will assume the gas-tax.

This virtual union of the two companies dashes the hopes of those who were looking for the results of competition in reductions in price, and will disappoint the expectations of many. One good, however, will be accomplished by it. It will be the means of introducing in this city the excellent gas-meters of Code, Hopper & Co., and R. H. Gratz & Co., of Philadelphia, who are large stockholders in the Metropolitan, but whose meters have heretofore been ignored by our city companies. Whether the coming winter will witness the granting of any more charters for gas companies we are not prepared to say; but, as the people have been so completely disgusted with the avaricious spirit displayed by the two old companies, it would not be at all surprising if an attempt were made to obtain charters for one or two more corporations, and thus verify the old maxim—"competition is the life of trade." Some inquirers are asking what has become of the "Hydrogenated Fuel Company." Perhaps its charter may be bought for a consideration. The liberty given it "for heating *and other purposes*" constitutes a broad scope, and in the hands of designing men it might be made to cover a multitude of evils.

A DANIEL COME TO JUDGMENT.

The London *Journal of Gas-Lighting* attempts to defend those injured innocents, the New York Gas-light companies, for raising the price of gas, and in the following language strives to excuse them for imposing the gas-tax on consumers:

"The New York papers are highly incensed against the gas companies of that city for having given notice to their customers, that the tax of fifteen cents ($7\frac{1}{2}$ *d*.) per 1,000 feet, imposed by the recent Act of Congress, will be added to their gas-bills. Public writers in America appear to be ignorant of the inexorable law of political economy, that consumers must ultimately pay the taxes imposed on manufactured articles, and gas comes strictly within that category. It is alleged that there is a difference between a public body and a small trader, but the difference is only in idea. *If the price previously charged were only fairly remunerative for the capital and labor employed in the production and distribution of gas, an addition to the price equal to the tax imposed does not increase the profits of the company, but rather places them at disadvantage, by tending to diminish the quantity consumed.* The gas companies of America would, indeed, be fully justified in raising their prices, independently of the tax, to compensate for the increased advance in the price of coals, wages, and of every other element in the cost of gas, consequent on the depreciation of the currency. The loss they must experience in having to pay in gold, or in gold's worth, and to receive payment in paper, must be much more than the direct tax of fifteen cents per thousand feet. According to the last advices, gold was at a premium of from 18 to 20 per cent., or, in other words, 118 or 120 dollars in paper must be paid for 100 dollars worth of coal. Labor would rise in a still greater proportion, owing to the drain to supply the army, and the profits of the American gas companies must disappear unless they advance their prices with the rise of prices of all other articles."

The italics in the above extract are our own. The implication that the profits of our metropolitan gas companies are "only fairly remunerative" is enough to cause a smile to appear on the most stolid countenance, and we can fancy the chuckle involuntarily arising from the stockholders of these companies, on perusing the lines so emphasized. In view of the diminished profits to be expected since the enactment of the excise bill by Congress, we magnanimously offer—being prompted solely by motives of the kindest nature—to take such unremunerative stock from off the hands of its present owners, and to pay them *par!* Will any of the shareholders avail themselves of this generous proposal? *Pater familias* predicts that "the profits of the American gas companies must disappear," and who so competent to judge as he?

The Manhattan Gas-Light Company have not yet agreed to pay the tax themselves. From another clause in the sentence we have italicised, we see the magnanimity of this neglect to comply with the wishes of their consumers. Burning with patriotism, and being unwilling to realize large profits in times which try men's souls, they would rather show by the effulgent light of their example how nobly adversity may be borne; and thus they choose to be placed "at disadvantage!" The London *Journal*, knowing the modesty of the Manhattan Company will not allow them to sound their own praises, lets us into the secret of the matter, by revealing the fact that, "an addition to the price equal to the tax imposed, does not increase the profits of the company, but rather places them at disadvantage, by

tending to diminish the quantity consumed!" But after the delivery of this sage opinion, that increasing the price is a "disadvantage" to this wealthy company, the *Journal* goes on to say that "the profits of the American gas companies must disappear unless they advance their prices." What is to be inferred from such a muddle? The gas companies must be in a sad predicament! If they raise their prices they are placed at a "disadvantage," while if they do not raise them their profits "must disappear." Which horn of the dilemma will they take? Perhaps the learned editor of the *Journal*, who is so well acquainted with the "inexorable law of political economy," will help them out of the difficulty.

WATER-METERS.

One by one, testimonials in favor of water-meters come in. Parties who have used them, even those having previously entertained strong prejudices against them, always become convinced of their value. The reports of the various water companies bring still additional evidence of the growing favor in which they are held. But a few weeks ago we noticed the endorsement given to these valuable instruments by the Board of Public Works of Chicago, Ill. Since then we have received the report of the Cochituate Water Board of Boston, Mass., in which the reference to meters, and the experience in using them in that city, prove their efficiency beyond dispute. It is conceded by all water companies which have used them, that, by their adoption, many advantages would ensue, and a much less drain be made upon the capacity of the works. Consumers, too, would be benefited, and although many of them now entertain an unaccountable prejudice against meters, they would be among the first to acknowledge the benefits conferred by them.

At present the price of the forms of meters now used is a serious objection to their general adoption. This we hope to see remedied ere long, but we are of the opinion that, even at present prices, water companies would find it more to their advantage to introduce them than to expend large sums in extensions of reservoirs and new sites for additional works and machinery. Wastefulness, only, would be checked by meters, while all the water absolutely necessary to the wants of a household would be furnished at no greater, and perhaps much less expense to the consumer than before.

We are glad to see that the American Institute of this city have offered a prize of a silver medal for the best water-meter. This may bring out new inventors. At present the palm of superiority is yielded by common consent to Mr. WORTHINGTON, whose instruments have given satisfaction wherever used. Trials are being made with meters of cheaper construction, and some of them are said to have been pronounced by competent judges perfect, and to combine cheapness, reliability, and durability—three essential qualities. We shall eagerly look for any new inventions in this line, being convinced that the future demand for reliable instruments will be large.

WHAT THE BROOKLYN, N. Y., GAS COMPANY SHOULD DO.—Now that the Manhattan Company has knuckled to its powerful competitor the Metropolitan, it is proper that the old Brooklyn should sue for peace with its young and vigorous rival the Citizens'.

A year ago we predicted that within three years the stock of the Citizens' would bring more in the market than the Brooklyn, and the prediction is being rapidly verified, although the time has not expired. Then the old company's stock was at 140 and the new at 80. Now they are both approaching par. They will soon cross the equator, the new to rise high in the firmament of values, and the old to sink below the horizon. The only salvation for the Brooklyn is to go to its marrows and be forgiven. It needs absolution badly.

ANSWERS TO CORRESPONDENTS.

A. S. F., of Me.—*We have handed your note to the proper party, who will communicate with you.*

F. B. C., of Ky.—*It is altogether a question of economy. The expense of altering the works we should think would not be much. You will find the address of several parties in our advertising columns, who will inform you as to the details of this.*

P. K. G., of N. Y.—*Wood-gas is not new. It has been repeatedly used all over the world, and where coal is high in price and wood abundant, the latter answers very well and will make a gas of good illuminating power.*

L. F., of Pa.—*The company you refer to was one of the first to succumb to the effects of competition, and long ago went out of existence. We doubt whether your claim is worth anything, but it may be well for you to inquire more particularly about it.*

E. B. T., of Ill.—*The long expected article has come at last. You will find it on another page.*

J. T. S., of N. B.—*The machine is not yet perfected, but it will shortly be brought before the public, when we will have a full description of it.*

CORRESPONDENCE.

PETROLEUM GAS.

Albany, N. Y., Oct. 1st, 1862.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

In their ordinary operation, the Aubin Works now make from petroleum or kersosene tar either, from 150 to 200 feet per gallon, as a more or less rich gas is desired. In the case even of the larger yield, the gas is very fine, and never smokes. In a trial lately made with coal-gas tar enriched with petroleum (9-10 tar and 1-10 oil), the yield was over 100 feet per gallon of the mixture, but the gas only of the quality of coal-gas.

These great results are owing to improvements made last summer, but not published until now to give them the conclusive test of practical use. In evidence of their value I add that, as we now set our retorts, they last three times as long as formerly, and require only half as much fuel, and yet give more heat. One word more. The Aubin principle is right. When first introduced the works were defective in their construction. In common sense I ask parties interested to judge of them by what *they are now*, not by the mistakes they have corrected. Very respectfully yours,

H. Q. HAWLEY.

EXTENSION OF THE PHILADELPHIA WATER-WORKS.—The ordinance reported by the Finance Committee of the City Council of Philadelphia authorizes the creation of a loan of $900,000, to be expended for the purpose of furnishing to the citizens a better and purer supply of water than that which is now obtained in some parts of the city. The items of the bill are as follows: For a 40-inch main in Columbia avenue, from Spring Garden reservoir to Tenth street, $109,350; for a 30-inch main in Columbia avenue, from Tenth to Seventh street, and on Seventh street to Kensington reservoir, $67,500; for building a retaining wall around and raising the Kensington reservoir, $55,000; for a 48-inch connecting main, from Columbia avenue reservoir to Spring Garden reservoir, $46,500; for a 48-inch ascending main, from Fairmount works to Corinthian avenue reservoir, $65,000; for the purchase of ground and erection of a reservoir in the Twenty-fourth ward, $100,000; for a Cornish engine, ascending main, alterations to buildings, etc., at the Spring Garden works, $135,000; for the purchase of ground and the erection of works and reservoirs in the Twenty-first ward, $250,000; for contingencies, etc., $80,000.

These desirable improvements will abolish the Delaware works, which have long been a disgrace to the city of Philadelphia. Each of these improvements is positively needed for the welfare and comfort of the citizens, and must be obtained sooner or later. Chief Engineer Cassin, as soon as authorized, will at once commence the good work, and push matters forward with his usual energy and activity. Mr. Cassin, since elected to his position, has introduced many beneficial changes into the Water Department, which have saved the city considerable money. The Spring Garden Water Works have been repaired, and the supply of water was recently turned on. The dirt was all removed from the forebay, and, although the works are not all that can be desired, yet they have been made to meet the demand on them much better than generally expected.

THOMSON'S PATENT PETROLEUM GAS.—We refer our readers to the advertisement of Mr. J. E. Thomson of Toronto, C. W., which appears in this issue of the JOURNAL. From the certificate of Mr. Stephenson, it will be seen that Mr. Thomson's process has been tried, and that success has crowned his efforts to make a cheap and pure gas from petroleum.

THE EXPLOSIVE COMPOUND FORMED IN COPPER GAS-PIPES.—A correspondent of the London *Times* makes the following remarks upon the explosive compound formed in copper gas-pipes:

"It has been discovered that when gas-pipes constructed of copper or bronze have been long submitted to the action of ordinary coal-gas, an explosive compound of copper and acetylene (one of the many ingredients of coal-gas) is formed. When dry this compound detonates with extraordinary violence, as soon as it is rubbed, struck, or heated. Already some accidents have occurred; and some workmen lost their lives, while cleaning large copper gas-pipes, from this circumstance. No such explosive compound appears to be formed when iron or lead is used. It is evident that large copper gas-pipes are unsafe; and that some other metal should be substituted for the copper, as the latter may give rise to explosion at any moment. As concerns small pipes constructed of this metal, they should not be allowed to get foul; and, when about to be cleaned, hydrochloric acid should be introduced into them for about ten minutes, before they are submitted to any heat or friction. Hydrochloric acid decomposes the explosive compound, combines with the copper, and puts the gas acetylene at liberty. The acid may then be washed out with hot water."

[In the AMERICAN GAS-LIGHT JOURNAL, September 1, 1859, and October 1, of the same year, may be found instructive articles upon this explosive compound.—ED.]

LLOYD'S MILITARY MAPS.—Mr. J. T. Lloyd, of 162 Broadway, has sent us copies of his various maps of the United States, which excel anything of the kind we have seen. These maps, we understand, are extensively used in the war and navy departments in Washington, and they have received the sanction of our most eminent commanders. The map of the lower Mississippi river, from St. Louis to the Gulf of Mexico, contains the name of every planter in the vicinity, and its correctness is vouched for by the publisher. Mr. Lloyd is doing more to disseminate an accurate knowledge of the geography of our country, than all the other map publishers combined.

GAS STEALING IN ENGLAND.—A man named George Wallis, a gardener by trade, has been recently convicted of stealing 500 cubic feet of gas from the Commercial Gas Company of London. This rogue was caught burning the gas by the inspector of the company, and it was proved that he had burned it at least four nights, while the constable who took the prisoner into custody, said he believed gas had been surreptitiously burned by him for twelve months. The Justice sentenced the prisoner to pay a fine of £5, and £8 per day for four days—the time the gas had been consumed by him. The money not being forthcoming a distress warrant was ordered to issue, with directions that if there were not goods enough to satisfy the warrant, the prisoner was to be shut up for three months.

ANOTHER CASE OF GAS STEALING.—Two men in Stockport, England, named John Goodison and James Bailey, have been detected in fraudulently consuming gas. The gas company kindly consented not to prosecute them on condition of their making a public apology, and each giving the sum of two guineas to the Stockport Infirmary.

LARGE BALLOON.—A balloon for scientific purposes has been built in England by Mr. Coxwell. It is fifty-five feet in diameter and sixty-nine feet in length. The builder proposes to ascend five miles, for the purpose of making observations on the temperature and humidity of the air at different hights. He will use Professor Thomson's electrometer for electrical experiments. Trigonometrical observations are also to be made.

GAS-LIGHT COMPANIES NOT MONOPOLIES.

A REVIEW OF THE DECISION OF THE SUPREME COURT OF WISCONSIN, IN THE CASE OF SIDNEY SHEPHERD *vs.* THE MILWAUKEE GAS-LIGHT COMPANY.*

For the AMERICAN GAS-LIGHT JOURNAL.

Since your notice of the decision of the Supreme Court of Wisconsin against the Milwaukee Gas-Light Company, I have been unable to procure a full report of the case, but have examined the opinion of the Court, in the case of Sydney Shepherd, respondent, *vs.* The Milwaukee Gas Company, appellant. I desire now to review this opinion. It is desirable that all gas companies should fully discuss the subject, and if it appears that the opinion of this Court is just, and that the rules under which gas companies have conducted their business from the commencement are illegal, and it is improper for gas companies to require applicants for gas to subscribe to their rules, they should at once be altered so as to conform to the law.

The Court decides that the 9th, 14th, 16th, 17th, and 21st rules of the Milwaukee Gas Company are unreasonable, illegal, and therefore such as they cannot require applicants to subscribe.

The Court labors by a long argument to prove that the gas company was not a trading manufacturing corporation, nor a commercial establishment.

We may ask, what has this to do with the question at issue? Perhaps, if the Court had admitted that it was a trading manufacturing corporation, its "rules and regulations," which are similar, indeed the same, with a few immaterial changes, to the "rules" adopted by all American gas companies, and which they have acted under since they severally commenced the manufacture of gas; these rules, having the sanction of long established usage, would have to be admitted as legal, and could not have been pronounced unreasonable.

These gas "rules and regulations" were originally formed by the gas companies of England, and were introduced into this country with the first manufacture of coal-gas, and have been in use by the American gas companies, with a few immaterial changes, for upwards of twenty years, without objection or contradiction, to regulate the sale of gas.

The Louisville Gas Company adopted these rules the 24th of August, 1839, twenty-three years ago. The 9th, 14th, and 21st rules of the Milwaukee Gas Company are verbally the same as the rules of the Louisville Company, and during a term of twenty-three years no objection has been made to these rules by applicants for gas or consumers.

In a note to Blackstone, vol. 2, sect. 31, we find that "proof of a regular usage for twenty years, not explained or contradicted, is that upon which many private and public rights are held, and sufficient for the jury in finding the existence of an immemorial custom or prescription."

The Court admits that the gas company was empowered to make all such needful rules and regulations for their own and for the convenience and security of the public as are just, lawful, not capricious, arbitrary, oppressive, or unreasonable, and require the applicant for gas to subscribe the same.

A question here arises,—have these "rules" the force of by-laws, or would the law consider the rules of a gas company by-laws? "The regulations which railroad companies adopt to secure the safety of travellers and to protect their own rights and privileges, are not, properly speaking, by-laws. Their validity depends upon their reasonableness, and is a question of fact for the jury." Commonwealth *v.* Worcester, 3 Pick. (Mass.) R., 462; State *v.* Overton, 4 Zubr., 435.

"Whether a by-law is reasonable or not, is a question for the Court solely; and evidence to the jury on the subject, showing the effects of the law, was held inadmissible. To set aside a by-law, however, for unreasonableness, there should be no equipoise of opinion upon the matter, but its unreasonableness should be demonstrably shown." (Paxson *v.* Sweet, 1 Green (N. J.) R., 196.)

"Courts, in construing by-laws, will interpret them *reasonably;* not scrutinizing their terms for the purpose of making them void, nor holding them invalid if every particular reason for them does not appear." Vintners *v.* Passey, 1 Burr R., 235, 239, Dennison, J.; Workingham *v.* Johnson, C. T. H., 285; Colchester *v.* Goodwin, Carter, 119, 120. (See Angell & Ames on Corporations, sect. 357.)

The 8th rule ought to be taken in connection with the 9th; it is as follows: "The Inspector, unless otherwise ordered by the Company, shall introduce the gas into any premises within range of the pipes, whenever he shall be satisfied that the fittings are put up in their proper places, in a workmanlike manner, and are perfectly gas-tight." 9th rule: "The Company shall, at all times, by their Inspector or other authorized agents, have the right to free access into the premises lighted with gas, for the purpose of examining the whole gas apparatus, or for the removal of the meter and service pipe."

The Court decides that the 9th rule cannot be upheld, or at least a party cannot be required to subscribe so it to entitle him to be furnished with gas. If this 9th rule, in connection with the 8th rule, were interpreted *reasonably*, there then could be no objection to it. Under the authority given by the rule the company never intended to visit premises at unreasonable times, or without first applying at the premises for admission. It frequently is necessary to examine the gas apparatus and to remove and replace meters and service pipes, and to visit the premises to take the state of the meter. If the words, at all reasonable times, were substituted for "all times," I suppose the Court could not have entertained an objection to the rule, and I doubt if the Court had the right to scrutinize the terms of this rule in order to make it void; the unreasonableness of the action of the Gas Company under the rule ought to have been clearly demonstrated.

Rule 14. "The Company reserve to themselves the right, at any time, to cut off the communication of the service pipe, if they shall find it necessary to do so in order to protect the works against abuse or fraud."

If all were honest it would be unnecessary for the company to reserve this right to protect the works against those who might tamper with the meter and otherwise obtain gas fraudulently. An honest man would not object to subscribing to the rules because of this 14th rule.

Suppose some evil disposed person should disconnect the fittings and let the gas stream out, according to the opinion of this Court the Company must first apply to some legal tribunal for permission to cut off the service pipe and stop the waste.

16th Rule. "After the admission of gas into the fittings, they must not be disconnected or opened, either for alterations, repairs, or extensions, without a permit from the Company, which can be obtained at their office free of expense. Any gas-fitter, or other person, who may violate this regulation, will be held liable to pay treble the amount of damages occasioned thereby."

The Court evidently does not understand the reason of this regulation of the Company. It is solely to protect the consumer of gas from waste, unpleasant smell, and, perhaps, danger to himself and property. The 5th, 6th, 7th, and 8th rules are all made to guard the consumer, to prevent improper fittings in his premises; the pipes and fittings are inspected when put up, to see that they are of proper size and quality; then they are charged with air, under pressure, by means of an air-pump, which indicates a leak or bad joint if one exists, and the Company refuse to turn the gas in the house until these fittings are perfectly gas-tight. If the supervision of the Company then ceased, and the consumer had the pipes and fittings extended, as they frequently do, without the Company having any notice or opportunity of retesting the fittings, the new work might be left in a leaky condition, sufficient gas might escape to form an explosive mixture with the air, and when touched with flame explode, destroying property, perhaps life. Solicitude for the comfort and safety of the consumer alone prompted this 16th rule, which the Court considers such a monstrous interference with the rights of the citizen that "the statement of the proposition is its answer."

As to the 17th rule, a gas company certainly has the right to require consumers to furnish meters, or to rent meters, or the Company may furnish meters gratuitously; they may furnish alcohol or require the consumer to pay for it—all this is a matter open to agreement between the parties, and there can be nothing in the matter contrary to law.

As to the 21st rule, which merely provides that the rules may be changed, the consumer, of course, cannot be bound by a new rule which he has not signed or concurred in.

The Court uses this language: "If a company were chartered with the exclusive privilege of manufacturing and selling bread in the city of Milwaukee, would it be contended that the company were under no obligation to supply and sell bread to any but such persons as the company should capriciously select? Odious as are monopolies to the common law, they are still more repugnant to the genius and spirit of our republican institutions, and are only to be tolerated on the occasion of great public convenience or necessity, and they always imply a corresponding duty to the public to meet the convenience or necessity which tolerates their existence."

In this indirect manner does the Court apply this epithet monopoly to the Milwaukee Gas Company. These words were not uttered hastily by an attorney to prejudice a jury, but they occur in a carefully prepared opinion emanating from the Supreme Court of Wisconsin. They do not appear necessary to elucidate any point before the Court; the purpose for which they were introduced I leave those who may read the opinion to determine.

The case cited of a company having the exclusive privilege of making and selling bread to the citizens of Milwaukee, would be strictly a monopoly within the meaning of the law, because it would take from the people a right to make and sell a commodity common to all, and vest the whole right to do so in a corporation. Had the Legislature of Wisconsin granted to the Milwaukee Gas Company the sole right of dealing in and supplying artificial light to the citizens of Milwaukee, such as fats, oils, candles, articles for illuminating purposes in common use among the people, then the Legislature would have granted one of the monopolies odious to the law; but, on the contrary, the citizens of Milwaukee are as free to use and deal in all their light-yielding commodities, since the creation of the Gas Company, as before. The Gas Company has only placed within their reach a new light, a mode of illuminating which they would not have enjoyed without the incorporation of this joint stock company, which now supplies the citizens with gas. The Gas Company is not a monopoly within the meaning of law.

The Court may be excused for want of information respecting the operations of gas companies displayed in that portion of the opinion which states—"It (gas) is not an article of trade, because it is not bought, measured, and delivered in quantity, but is furnished, used, and to be paid for after it is used, because it cannot be measured before."

It is well known that gas may be, and is packed up in a compressed state, and sold to railroad companies to light their cars. It is measured and sold in quantity in many other instances, and I assure the learned Court that gas, if measured at all, is always measured before it is used or burnt, for it would be impossible to measure it afterwards. But this technical knowledge is not expected to be in the possession of the Court—can we believe the Court equally ignorant as to the legal meaning of the word monopoly?

No one could receive the rudiments of a legal education without meeting with a clear definition of the kind of monopolies that were odious to common law. We fully agree with the Court that these monopolies would be repugnant to the genius and spirit of republican institutions, and for this reason have never been introduced into the United States, although they still subsist to a considerable extent in Europe.

Monopoly, in law, is defined by Sir E. Coke (3 Inst., 181, c. 5), "An institution or allowance by the king, by his grant, commission, or otherwise, to any person or persons, bodies politic and corporate, of or for the sole buying, selling, making, working, or using of anything whereby any person or persons, bodies politic or corporate, are sought to be restrained of any freedom or liberty that they had before, or hindered in their lawful trade."

As an example of these monopolies so odious to law: In the year 1601, a list was read in the House of Com-

* The opinion of the Court may be found on page 106 of our last issue.

mons, of England, of commodities for the exclusive traffic in which patents had been granted by Queen Elizabeth, to her courtiers and others. "Currants, salt, iron, powder, cards, calfskins, ox shinbones, felts, canvas, train oil, lists of cloth, potashes, coal, vinegar, steel, brandy, brushes, pots, paper, starch, tin, sulphur, saltpetre, lead, rudiments of latin grammar, oil; transportation of iron ordnance, of beer, of horn, of leather; importations of Spanish wool, of Irish yarns. These are but a portion of the commodities which had been appropriated to monopolists. * * * * * These monopolists were so exhorbitant in their demands that in some places they raised the price of salt from 16 pence to 14 and 16 shillings a bushel." (See Hume's England.)

At length the grievance became quite unsupportable, and notwithstanding the strenuous opposition of the Crown, it was finally abolished by a statute of James I., cap. 3. Its provisions did not extend to patents for new inventions, nor to grants by act of parliament, but it suppressed all monopolies that were odious to the common law.

We may not be surprised to hear a certain class of men, when seeking political preferment by the vote of the dear people, for sinister purposes, rail at corporations and call them monopolies, contrary to the spirit of republican institutions; but the dignity of a Court forbids such idle declamation, nor can a Court so indulge without soiling its ermine.

"An absence of great wealth was common to the inhabitants of the United States at the commencement of the national independence, and such a condition of society came soon to be deemed preservative of our republican institutions; and it was this consideration which induced the abolishment of entailments, the suppression of the right of primogeniture, and protracted fiduciary accumulations. By the operation of such legislation, a State would have accomplished but little in the way of banking and insurance, and in turnpikes and railroads, had not the absence of great capitalists been remedied by corporate associations, which aggregate the resources of many persons, and thereby yield the advantage of great capitals without the supposed great disadvantages of great private fortunes." (See Hunt's *Merch. Mag.*, Dec., 1850.)

"The most numerous, and, in a secular and commercial point of view, the most important class of private civil corporations, and which are very often called 'companies,' consists at the present day of banking, insurance, manufacturing, and extensive trading corporations; and likewise of turnpike, bridge, canal, and railroad corporations. These joint stock corporations, by a combination of capital and skilfully directed labor, have wonderfully contributed to the commercial prosperity of our country, and at no former period were they ever more rapidly increasing numerically than at the present." (Angell and Ames on Corporations, sect. 40.)

I have occupied much space to show the meaning of monopolies in contradistinction to corporations, because it has become too much the habit for demagogues and other factious persons to confound the two in order to inflame and prejudice the public mind against incorporate companies.

Louisville, Ky., October 8th, 1862.

ROBT. G. COURTENAY.

THE COMING REVOLUTION IN THE MANUFACTURE OF GAS.

(*Continued from page* 75.)

PETROLEUM GAS.

Since the publication of the first part of this article, setting forth the danger and delusion of water-gas, parties formerly among the most prominent advocates of that system are now urging rosin-gas companies to change their works, *not to water-gas*, but to recent devices for making gas from petroleum. Already their experience is beginning to prove that this oil and its residuary products are the only gas-making materials which can be substituted for rosin and coal. For such use no other hydrocarbon known will bear any comparison with petroleum. Its richness in light-giving material is marvellous. Even after the benzole and kerosene have been expelled from it by distillation, the heavy oil left can be nearly all converted into gas of many times the candle power of coal-gas. Parties accustomed to the use of that gas can have no conception of the amazing richness of gas made from petroleum, nor of the magnificent illumination which it gives out even when consumed through burners passing only 1 to 1½ feet per hour. Thus consumed, the writer has found the light equal in power to that obtained from 6 to 8 feet of ordinary coal-gas. This is hard to believe, but it is true, and what is somewhat paradoxical, it is one of the chief causes why petroleum-gas has not been more generally used. The causes are two. *First.*—From its great richness, it would so reduce the consumption that gas companies cannot afford to sell it. When pure, it can only be burnt through the smallest burners. From the carbon in it being so greatly in excess, if larger burners are used a dense smoke is created, and even with those of 1 foot a slight draught of air will produce smoke. *Secondly.*—The methods in general use for making petroleum-gas, and therefore those from which it is judged, are very defective. From the failure of rosin the companies formerly using that material now run petroleum upon coke into their retorts, as their custom had been with rosin. Others, stimulated by the occasion, are introducing old forms of oil retorts, again and again tried in Europe and condemned. From the excess of carbon contained in petroleum none of these methods are adapted to its distillation. Hence, only about 50 feet of gas of a prohibitory richness have been obtained per gallon of oil used, and consequently the cost of manufacture is great, and the large quantity of vapor passing over to be condensed into tar must in time clog up pipes, burners, and meters.

Petroleum-gas, therefore, in an unadulterated form, cannot be advantageously used either for private or public gas-works. This conclusion, if our investigations should cease here, would lead us to a curious reflection—that is, that the very value of petroleum-gas is the chief objection to its use, and the cause of its defective manufacture. A more philosophic reflection, however, would be—if the intrinsic value of this gas is so high, there must be a way to utilize it. In support of this conclusion the writer submits the following hypothesis as the result of his experiments, and the reflections growing out of them.

To make petroleum gas as a substitute for rosin and coal-gas, no method can succeed which does not convert most of the vapors formed into fixed gas,—and also dilute the gas thus produced, so as to increase its volume, and thus use for producing light the excess of carbon in the petroleum-gas, which otherwise, when used in ordinary burners, would pass off as smoke. The first of these conditions requires that the apparatus used should be adapted to supply, *as rapidly as exhausted*, the heat necessary to the gas-making process. Coke enclosed in a retort cannot be relied on to do this, and hence the poor and uncertain results obtained by that method. Another, and the principal requirement of this condition, is, that both process and apparatus should be arranged not only to graduate the action of the heat upon the oil so that it must be converted into vapor, and that vapor subjected to the action of the retort only as fast as heat can be supplied to convert it into fixed gas, but also to expel the gas as soon as possible after its generation from the retort, where, if allowed to remain, it will be again decomposed.

A very little reflection will show that the above hypothesis is founded on the laws of nature, and that all methods which subject the rich vapors of petroleum to the action of heated coke, or permit them to remain in continued contact with iron heated to redness, are violations of those laws.

The second of the above conditions, viz., the necessity of diluting petroleum-gas, is apparent from what has been stated above. It may be done in two ways, either by hydrogen generated contemporaneously with the olefiant gas from the oil, or by the addition of atmospheric air after the gas is made. What is called water-gas is but the result of the dilution of olefiant gas with hydrogen obtained from water, and if any way could be devised to cheapen the expense of decomposing water without any material formation of the deadly gases, carbonic oxide and carbonic acid, no other material could supply hydrogen as cheaply or conveniently. As we have seen, however, water-gas is a delusion, and until science has taught us how to decompose water otherwise than by the destruction of iron or coke, we must resort to other materials for the hydrogen we want. Of such there are several. Scrap leather for instance, the residuary products of our manufactories, peat, and, beyond all, common wood, will answer well. In the experiments made by the writer, and from which he was led to the above conclusions, the apparatus employed used wood in the form of sawdust to mix with the oil, and act both as a means of graduating the action of the heat upon it, and as a source of supply of hydrogen. The results were highly satisfactory. Treated as above, each pint of the oil used yielded twenty feet of gas of light-giving power equal to that of the best rosin-gas, and if further dilution was required, the yield to be increased to 25 feet or more, but at the expense of time and quality of course.

In stating that air can be used as a diluent of petroleum-gas, the writer is aware he will shock the prejudices of many. Everybody knows that air and gas form an explosive mixture, and that even 10 per cent. of air, when added to coal-gas, will almost destroy its illuminating power. These prejudices will render of little account what the writer may say; nevertheless, the results of his experiments are here given. Coal-gas cannot bear the addition of air from its deficiency of carbon. From the excess of that substance in petroleum-gas when undiluted, it is only by the addition of air that it can be consumed in the ordinary burners. The following experiment, frequently made by the writer, proves this. Pure oil-gas was burnt through a 5-foot coal-gas burner. A dense smoke was given out, viz., the excess of carbon—which, from the gas not being supplied with sufficient air as it passed from the burner, could neither be burnt or heated to incandescence—passed off and was wasted. Gas mixed with air, half each, was then let on, and the light became clear and there was no smoke. Air being of slightly greater specific gravity than gas, the addition of it decreased the flow through the burners, without materially affecting the light, although the quantity of gas consumed was only one-half what it was in the first experiment. To gas companies this feature of the mixed gas would be an objection, but a gain to private consumers.

As to the danger of thus mixing air with gas: To make coal gas explosive requires nearly 90 per cent. of air, and for oil-gas still more. As gas-light is never used where, in case of leakage, *the air is not in excess*, the previous addition of 50 per cent. of air even renders it more absolutely instead of less safe; as of course when the gas is diluted it will take longer before a sufficient percentage of gas can flow into the room to make the atmosphere there explosive.

(*To be concluded.*)

PARAFFIN.—Cannel coal is the source yielding the largest amount of paraffin. The paraffin oil is the heaviest which passes over from a still in the distillation of coal-tars—its specific gravity ranging from 900 to 930. It is placed in a vat and cooled down with ice or other refrigerating agents, when it crystallizes in large scales. It is then lifted and strained, placed in bags, and submitted cold, to severe pressure. It is then remelted, and treated with half its weight of strong sulphuric acid, at a temperature of 356° Fah. The acid removes any impurities, consisting of bitumen, that may be in it, after which it is washed with water, run into cakes, and pressed again, while warm, in a hydraulic press. It is again melted and treated with caustic potash in solution (some use alcohol) to remove any resinous matter that may be left, after which it becomes as clear as water before solidification. It is now admitted that there are several varieties of paraffin, but there is little to distinguish them excepting their melting points, which range from 113° up to 139° Fah. Aniline colors impart to paraffin candles most beautiful red, purple, and violet tints.

GAS IN NEW ZEALAND.—A gas-light company has been formed for the purpose of lighting Auckland, the seat of Government of New Zealand. The contract for the erection of the works has been awarded to Mr. A. K. Smith, of Melbourne, who will build them at a cost of £16,000.

RECENT ENGLISH PATENT.

A patent has recently been granted to William Mattieu Williams, of Staffordshire, England, for "*An improvement or improvements in treating coal and other bituminous minerals and peat, in order to obtain solid and liquid hydrocarbons therefrom, and in apparatus to be used for that purpose.*"

The object of this invention is so to distil coal and other bituminous matter as to produce a larger proportion of liquid and solid hydrocarbons, at the expense of the gaseous bodies which are generated at the same time. In the distillation of coal, the gaseous products of the distillation are principally produced by the decomposition of the solid and liquid products; this decomposition being effected by such vapors coming in contact with portions of the retort or its contents, heated to a higher temperature than that at which the vapors are liberated from coal. By conducting the distillation in the manner and by means of the apparatus invented by the patentee, the overheating of the condensible products first volatilized from the coal, is prevented, and thereby a larger yield of the condensible products is secured.

The apparatus for treating coals or other bituminous minerals in this manner, consists of a retort set in a reverbratory furnace, of which the top of the retort forms the floor of the furnace. The lower part of the retort tapers to a wedge shape, or, if it is short, it is made to taper on all sides, and to assume the form of an inverted cone, but when much longer than broad, the tapering is confined to the inclination of the two longer sides. A tray, which contains the coal or other bituminous mineral, or peat, is placed upon projections on the sides of the retort, near the top of the same. The sides of the tray are perforated or made of bars. The trays are introduced into, or withdrawn from the distillatory vessel, in a horizontal direction, at an opening in the sides of the vessel, which is closed by a door. The plate which forms the top of the retort, and the bottom of the furnace, may be protected from injury by the fire, by a layer or thin fire-tiles, or sand, or other similar material.

In working this invention, the fire of the furnace plays upon the top of the retort and heats it, and the heat from the top is radiated downwards, upon the contents of the tray, and liberates the volatile hydrocarbons, which pass out through the openings, or between the bars of the tray, or through perforations in its sides and bottom, and descend to the lower part of the retort, from which the condensed and uncondensed portions pass by a pipe fixed nearly at the bottom of the vessel. A small quantity of water, which is formed or volatilized with the hydrocarbons, condenses and occupies the bottom of the vessel, and may be let off by a stop-cock, fixed at the lowest point of the vessel.

In using this invention on a large scale, several retorts are set side by side in a bench. In this case, the retorts across the reverbratory arch of the furnace. Each of these retorts consists of a chamber, the sides and bottom of which may be made of iron or brick-work. The top of the chambers consists of a plate or series of plates of cast or wrought iron, on which the heat of the furnace is reverbreated by the arch or flue. In the middle of each retort is a wall or support of brick-work running from end to end of the vessel. These walls support the trays containing the material to be operated upon. The trays are introduced into the retorts at openings in the ends of the vessels, or in similar openings to those of gas retorts. Pipes conduct the condensed and uncondensed products of distillation away from the distillatory apparatus into a receptacle, where the condensation of the condensible products may be effected.

The distillation may be conducted either at the atmospheric pressure, or at a greater or less pressure than that of the atmosphere. In the first case the terminal pipe of the retort is open, and the condensed products run therefrom. In the second case, the bottom of the pipe is closed by a valve weighted, so as to give the required pressure. In the last case the terminal pipe of the retort is connected with an exhausting pump, or other exhausting apparatus, worked by steam or other power.

The claims are, "*First.*—The improvement hereinbefore described in treating coal and other bituminous minerals, and peat, in order to obtain liquid hydrocarbons therefrom—that is to say, subjecting these substances to a distillatory process so conducted that the volatile products pass rapidly downwards from the heated part of the apparatus, so as not again to be exposed to a temperature equal to that at which they were produced.

"*Secondly.*—The improvement in apparatus for treating coal and other bituminous minerals, and peat, in order to obtain solid and liquid hydrocarbons therefrom, hereinbefore described and illustrated—that is to say, constructing and arranging the retorts or distillatory vessels so that heat is applied at the top of the said vessels, and the volatile products conducted by a descending motion, from the heated parts of the said apparatus."

ANTHRACITE COAL IN SCOTLAND—SMOKELESS FUEL.

We understand that a seam of this valuable fuel has been discovered on the Carnock estate, in Fifeshire, belonging to Mr. Hutchinson, of Kirkcaldy. Anthracite contains greatly less bituminous matter than the ordinary coal, and a very much larger proportion of carbon. It is, in fact, a species of natural charcoal, the smoky properties having been eliminated from the bowels of the earth. It is not considered a distinct kind of coal, but merely a changed form of the common bituminous deposit, being found generally at the extremity of the ordinary coal-beds. "Anthracite beds," says Mr. Lesley in his work on coal, "are not separate deposits in another sea, nor coal measures in another area, nor interpolations among bituminous coals, but the bituminous beds themselves, altered into a natural coke, from which the volatile bituminous oils and gases have been driven off." Fifty years ago this splendid fossil fuel, which is hotter than coke, quite as smokeless, and with little or none of those sulphurous fumes which are the disagreeable accompaniments of the latter, was thrown away in the United States, where it is most plentiful, as useless rubbish. In 1857 the quantity of anthracite raised in America was no less than 6,431,379 tons, and the year before it was even larger, being 6,751,542 tons. In 1840 the total amount raised was only 864,384 tons. The large and steady increase in production between that time and 1856, testifies strongly to the superiority of this kind of coal for heating purposes. It is used extensively for smelting, and the decrease noticeable in 1857 is owing to the depression then existing in the iron, as, indeed, in all other trades. The quantity of anthracite raised in South Wales in 1857 amounted to 1,485,000 tons, and it is employed in nineteen furnaces in Glamorganshire, Brecknockshire, Caermarthenshire, and Pembrokeshire. The best bituminous Newcastle coal shows about 60.50 elements of carbon to 35.50 of bitumen, volatile matter, and water, and 4.0 of ashes. In Wales the best anthracite gives a percentage of about 93.12 of carbon, 5.22 per cent. of volatile matter, and 1.50 of ash. Of that found on the Carnock estate, Dr. Anderson gives the following analysis: Carbon, 88.56; hydrogen, 3.70; nitrogen, 0.37; sulphur, 1.15; oxygen, 2.45; ash, 4.07, or a percentage of 93.04 of coke, the Welsh percentage being much about the same. Notwithstanding the great superiority of anthracite as a heating substance over other coal, it has not as yet been much used in Scotland. Doubtless, this is owing entirely to the fact that until the seam was discovered at Carnock there was none procurable nearer than Wales, and the cost of the long transit made it too high in price to be used with profit by Scotch maltsters and distillers, and foundry men. Its accessibility will now admit of their obtaining it at very much less money than coke, which it has superseded in many districts in the south of England. And no wonder that it was done so, for, independently of its superior heating power, it is said to impart to malt and grain a much finer flavor than that received when coke has been used for heating the kilns. Some of our largest distillers and maltsters who have given it a trial are quite agreed as to its excellence over coke. The Carnock seam can, we understand, be worked at a rate cheap enough to admit of the anthracite being sent to the London market to compete against coke, and several cargoes have already been shipped there by Mr. I. Brown, of Aberdeen, who is engaged in working it.—*Scottish Farmer.*

Gas in England.—Reductions in price of gas have been made in Manchester, by the City Council, under whose management the gas-works are, as follows: when the quarterly consumption is under 500,000 cubic feet, to 3*s.* 9*d.*; over 500,000 and under 1,000,000 cubic feet, to 3*s.* 8*d.*; over 1,000,000 and under 1,500,000 cubic feet, to 3*s.* 7*d.*; and 1,500,000 and upwards to 3*s.* 6*d.* per thousand cubic feet.

At Walsall, the price of gas has been reduced as follows: To consumers of less then 25,000 cubic feet per quarter, from 3*s.* 4*d.* to 3*s.* per thousand cubic feet; 25,000 cubic feet and less than 100,000 from 3*s.* to 2*s.* 10*d.*; and 100,000 feet and upwards, from 2*s.* 10*d.* to 2*s.* 8*d.* per thousand cubic feet.

At Pangbourne, new gas-works have been built. The gas-holder is on the sustaining principle, and is 25 feet in diameter. The mains are taken to White Church, and it is expected the consumption there will equal that of Pangbourne. The engineer states that any compact village of 1,000 inhabitants may have gas-works paying 7 or 8 per cent.; and indeed single mansions have been supplied with apparatus 8 feet square, giving 5 to 10 lights, at a cost of £25.—*London Builder.*

Siemen's Regenerative Gas-Furnace.—Prof. Faraday, the eminent English chemist, thus refers to the degree of heat evolved by the combustion of carbon in Siemen's gas-furnace, of which we gave a description on page 68 of this volume:

Carbon burnt perfectly into carbonic acid in a gas producer would evolve about 4,000° of heat; but if burnt into carbonic oxide, it would evolve only 1,200°. The carbonic oxide, in its fuel form, carries on with it the 2,800° in chemical force, which it evolves when burning in the real furnace with a sufficient supply of air. The remaining 1,200° are employed in the gas producer in distilling hydrocarbons, decomposing water &c. The whole mixed gaseous fuel can evolve about 4,000° in the furnace, to which the regenerator can return about 3,000° more.

PATENTS.

UNITED STATES

36,417.—C. B. Matthews, of Oquawka, Ill., for Improvement in Lamp Burners:

I claim the arrangement of the spring, D, with the lamp top, A, cone, C, and chimney, E, in the manner herein shown and described, so that the said spring will adjust itself, both vertically and laterally, to the chimney, and press the chimney with a yielding pressure in both directions, all as set forth.

I also claim having the wick fork or spur wheel shaft mounted upon a spring, in the manner and for the purpose herein shown and described.

36,419.—Antonio Meucci, of Clifton, N. Y., for Improvement in treating Petroleum and other Oils to produce a Vehicle for Paints and Varnishes:

I claim, first The employment or use of hyponitric acid, in treating petroleum, kerosene, or other oils, substantially in the manner and for the purpose described.

Second, Mixing petroleum or other oils, after they have been exposed to a current of hyponitric acid as described, with linseed or with linseed 'cakes" and fish oil, substantially in the manner and about in the proportions herein specified.

36,451.—C. W. Cahoon, of Portland, Maine, for Improvement in Lamps:

I claim a grooved clamp support for a vibratable chimney holder, substantially as set forth.

I also claim the combination of a grooved clamp support with a rimmed lamp head, substantially as set forth.

36,452.—M. L. Callender, of New York City, for Improvement in Vapor Burners:

I claim, first, Constructing the side wings, F, with open centers for the admission of air, as herein shown and described.

Second, The combination with the pipe, D, of the self-acting valve rod, d, as herein shown and described.

Third. The construction of the wings, E E, with the upper edges of their inner faces bent or ribbed, so as to form spaces or interstices for the admission of air to the flame, substantially as herein shown and described.

36,453.—Theodore Clough, of New York City, for improvement in Preparing Petrolum for the Manufacture of Illuminating Gas:

I claim, as a new manufacture, the gas-making oil obtained by treating petroleum substantially as described.

36,463.—Thomas Higgins, of Bow, England, for Improved Machine for Filling Dipping Clamps in the Manufacture of Matches, Tapers, &c.:

I claim the mechanical means above described for arranging splints, tapers and matches parallel to each other and descharging them into suitable dipping clamps.

36,472.—Charles McIntire, of Easton, Pa., for Improvement in Culverts:

I claim, in the construction of culverts to be used in water and quick sands, the combination of the upper arch of brick or stone, with the lower arch of iron, when the latter is constructed with the flanges, B and C, the flange B, being constructed to suspend the lower arch upon piles, stringers, or their equivalents, and the flange,

C, as a base support for the upper arch of brick or stone, in the manner and for the purpose herein described.

36,473.—John McKenna (assignor to himself, A. and T. McKenna,) of Pittsburgh, Pa., for Improvement in Faucets:

I claim a faucet having a division in the shank, forming separate and distinct ways with their outlets below the shank, and enabling the fluid to pass through both into the same vessel, or one to act as a fluid way and the other as an air vent, as occasion may require it, as herein set forth.

I also claim combining with the two-way shanks, L, the chamber, E, with the cut-off at its bottom, arranged below the line of the shank, for the purpose as hereinbefore stated.

36,474.—S. G. Morrison, of Williamsport, Pa., for Improved Lining for Coal-Oil Casks:

I claim the application of soap, substantially as and for the purpose specified

36,478.—C. H. Phelps, of New York City, for Improved Can or Tank for Coal Oil:

I claim, first, A sheet metal can or receptacle, provided with a faucet inserted in a screw plug for the purpose specified.

Second, The constructing of the faucet with two screws, substantially as shown, when used in combination with the screw plug, as and for the purpose herein described.

36,481.—Abraham Quinn, of New York City, for Improvement in Apparatus for Distilling Petroleum and Other Oils:

I claim, first, The still-neck, B, constructed with dams, y y, and having pipes, b and y', and applied in combination with such dams, substantially as herein specified.

Second, The basins, P P', placed within the chambers, C C', of the rectifiers, and in combination with the pipes, Q Q', substantially as herein specified

Third, The preforated diaphragms, p p p' p' p2 p2, arranged within the rectifiers, substantially as and for the purpose herein described.

Fourth, The arrangement of several rectifiers, in combination with each other, with the still retort, and with the device or apparatus for feeding the crude oil, in such manner that the vapors of the heavier oils, on their way to the condensing apparatus, meet the crude oil on its way toward the still retort, and heat the latter dil to such an extent as to extract the vapor of the most volatile portions of it, before it arrives at the retort of the still, substantially as herein specified

Fifth, The purifier, E, arranged in relation to the rectifiers, the feeding apparatus, and the worm, E', substantially as and for the purpose herein specified.

Sixth, The oil receiver, H, and chemical tank, I, and their pipes, S U, funnel, O, siphon, N, cocks, j k, and strainers, T T, the whole combined to operate substantially as herein specified.

36,488.—John Tagliabue, of New York City, for Improved Apparatus for Testing Coal Oil:

I claim, first, The employment of the holes, c c, in the water bath, C, in connection with the mark, d, for adjusting the hight of the oil in D, for the purpose set forth

Second, The employment of the glass capillary wick tube, H, for the purpose above described.

Third, Supporting the wick tube, H, by means of a poor conductor, for the purpose of preventing the transmission of heat from the flame, M, to the oil in D, substantially as herein described.

36,490.—Allen Walton, of Philadelphia, Pa., for Improved Bung for Oil Casks:

I claim in combination with the stave of a coal-oil cask, the screw tube, B, with its flange, b, the screw plug, D, and its head, d, and the intervening washer, m, the whole being constructed and applied to the stave as set forth for the purpose specified.

36,493.—L. J. Atwood (assignor to Holmes, Booth and Hayden), of Waterbury, Conn., for Improvement in Lamps:

I claim, first, Forming the lower end of the wick tube flaming or bell mouthed, in the manner and for the purpose specified.

Second, I claim the rachet cap, wick tube and exterior shell of the burner, in combination with the projections, 6 6, near the middle of the wick tube, and the bell mouth, 5, at the lower end of said wick tube, whereby the parts are held together as set forth.

Third I claim fastening the lower end of the spring, h, against the side of the wick tube without solder, in substantially the manner specified

Fourth, I claim the ratchet cap, i, with the notch, 7, in combination with the wick tube, e, and spring, h, for holding the said spring from moving sidewise, substantially as set forth.

36,500.—Joseph Banks, of New York City, for Improvement in Rotary Pumps:

I claim, first, The application of the keys, c, provided with dovetailed edges, d, in combination with the inner case, E, and cylinder, A, constructed and operating substantially as and for the purpose shown and described.

Second, The arrangement of the laterally sliding spring valves, h, in combination with the pistons, F, as and for the purpose specified.

Third, The arrangement and combination of the slides, f, springs, e, rollers, g, valve, h, and piston wheel, D, all constructed and operating as and for the purpose set forth.

36,514.—H. N. Gallagher, of Geneva, N. Y., for Improvement in Water Wheels:

I claim the wheel, A, composed of two rims, a a, placed at a suitable distance apart and provided with buckets formed of radial plates, B, and longitudinal halves, C, of hollow cones connected with the rims, a a, and a circular plate, D, on the shaft, C', of the wheel, as shown, in connection with the scroll, D', all arranged substantially as herein set forth.

35,570.—Rufus M. Merrill, of Chicago, Ill., for Improvement in Lantern Lamps:

I claim, first, The application of one or more air tubes or passages outside the oil cup of a lantern lamp, substantially as and for the purpose herein set forth and described.

Second, The spring catches, D D, when arranged substantially in the manner and for the purpose specified.

36,574.—C. B. Reichmann, of New York City, for Improvement in Holders for Lamp Shades:

I claim the lips, 4 4, and slots, 3 3, formed as specified, and employed for connecting the spring, c, to the ring, b, in the manner and for the purposes set forth.

36,577.—F. B. Scott, of Buffalo, N. Y., for Improvement in Rotary Pumps:

I claim, first, The arrangement of the piston cylinder, F, pistons, J, and cam, D, with the case, A, substantially as herein set forth.

Second, The hollow rotary shaft, P, in combination with the water chamber, S, substantially as described.

36,584.—J. B. Greene (assignor to E. P. Gleason), of Providence, R. I., for Heater for Lamp Chimneys:

I claim, as a new article of manufacture, the within-described heater for lamp chimneys, whether attached to the vessel or object to be heated, or distinct and separate therefrom as set forth.

36,588.—Eli Perry (assignor to himself and John Boley), of Baldwinsville, N. Y., for Improvement in Rotary Pumps:

I claim the combination with the spiral discharge passage, D, of the piston provided with curved concave wings, E E, and the feeder, G, the whole arranged and operating substantially as and for the purpose herein set forth.

36,590.—R. N. Eagle, of New York City, for Improvement in Snuffers for Lamps:

I claim, first, The making of the blades of snuffers or snuffing shears for lamps, constructed with chimneys or without, and burning flat or round wick, either concave or convex, to meet the convexity or concavity of the burner or tube holding the wick.

Second, So constructing lamp snuffers for trimming the round wick that the indentation in one or both blades, when the latter are opened, admits the wick, and, in closing, encircles and compresses it and accomplishes the work in a single and even cut in the manner described.

Third, Making snuffers or snuffing shears for lamps with one part of the blades straight and another part concave or convex, for the purposes set forth.

Fourth, A partial gallery or a circular raised rim for catching the crust or burnt part of the wick when removed.

PETROLEUM GAS.

THE AUBIN GAS-WORKS COMPANY, OF ALBANY, N. Y., have adapted their Works to petroleum and the heavy oil obtained from its distillation. Parties desiring information will be referred to Village Gas-Works thus adapted, where the ordinary yield of gas is from 150 to 200 cubic feet per gallon of oil. This yield, and the great improvements which experience has added to the Aubin Works, enable them to make a rich gas at a low cost—the only way to compete with kerosene.

THOMSON'S PATENT PETROLEUM GAS-WORKS.

STEPHENSON HOUSE,
St. Catherines, C. W., Sept. 26th, 1862.

I HAVE much pleasure in giving public testimony to the excellence, cheapness, and freedom from all kinds of annoyance from smoke or smell of the Petroleum Gas, made at my establishment, in the Patented Works erected by Mr. James E. Thomson. The Works have now been in operation for six weeks, and have given uniform satisfaction in every repect. They supply my establishment, the Stephenson House, St. Catherines, C W., with 180 burners, at a cost of 86 cents a night.

I most cordially recommend Thomson's Petroleum Gas to the general public.

To James E. Thomson, Toronto and Buffalo. (Signed) E. W. STEPHENSON.

St. Catherines, October 3.

WOOD GAS.

THE INVENTOR AND PATENTEE of a New and Improved Retort for Manufacturing Gas from Wood, Turf, &c., would call the attention of Gas Companies, and the public generally, to an invention which will be a great saving to the community, as they can thereby supply an exceedingly cheap, clear, and brilliant light, besides useful products in profusion. The Works can be seen in successful operation at the Cremorne Gardens, Fourteenth street and Sixth avenue, on application at the office of the Patentee, No. 23 Liberty street, New York, and where any information may be obtained, and where Companies or private individuals wishing to purchase rights for Hotels, Factories, Private Houses, Cities, Counties, or States, will please apply.

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NAVY DEPARTMENT,
Washington, Sept. 17, 1862.

J. T. LLOYD—Sir: Send me your Map of the Mississippi River, with price per hundred copies. Rear-Admiral Charles H. Davis, commanding the Mississippi squadron, is authorized to purchase as many as are required for use of that squadron.

GIDEON WELLES, Secretary of the Navy

PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consist in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir. The bituminous composition which unites and covers these Pipes is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

For Gas these Pipes are invaluable; the Gas-lining which we insert effectualy resists the action of Gas, and being non-conductors, there can be no condensation in them, and the joints made with the Patent Cement are so strong as to entirely prevent Leakage.

The cost of laying the Pipe is also small, compared with those of iron, and can be done by mere laborers. The Bituminized Pipes have been in use the last three years, for the conveyance of gas and have been ascertained to be as perfect now as when first laid down.

DIRECTIONS FOR JOINING THE PATENT BITUMINIZED PIPES.

Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

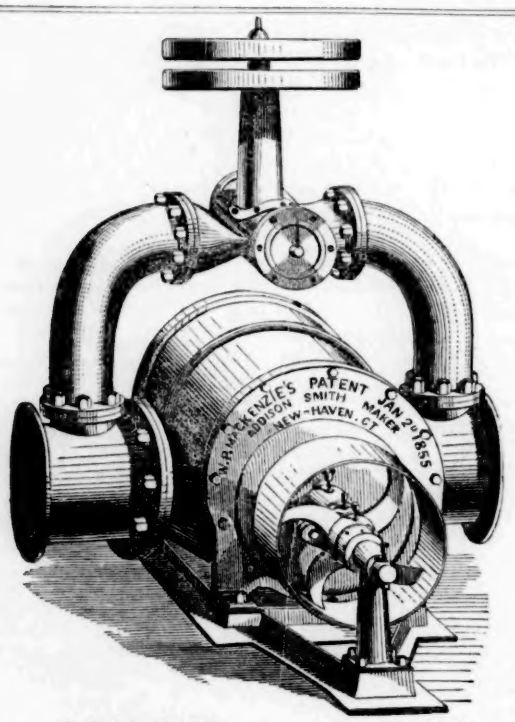
N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

All Orders should be addressed to

THE AMERICAN BITUMINIZED PIPE COMPANY,
OFFICE 24 WATER STREET, BOSTON, MASS.,
J. McGEARY, Agent;

or to FREDERICK W. BOND,
SOLE AGENT FOR NEW YORK,
58 LIBERTY STREET, (Between Broadway and Nassau Streets,) **NEW YORK.**

Cement for Joining, For Sale as above.



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They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

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For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

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A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

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Wm. D. Parrish. D. Parrish, Jr.

POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER BOXES, which have been adopted by the Post Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use, there will be less likelihood of mistakes, and consequent collision than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels, consists in having the Lanterns containing the colored lights, connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller Shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the colored lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof in pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed, are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that each colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red,	Represents	Number	1.	Two Green,	Represents	Number	2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign ○ colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○,	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.
	○. ○.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○.	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○, ○, ○, ○, ○.	
	○, ○, ○, ○, ○, ○, ○, ○.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○.	
	○, ○, ○, ○, ○, ○.
	○.
○, ○, ○.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2

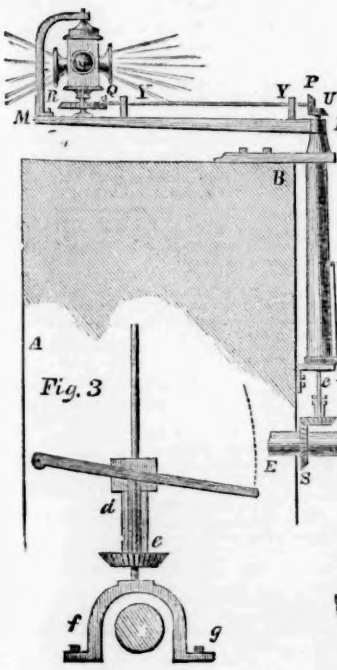

Fig. 3

(GREEN LIGHT)

Fig. 1

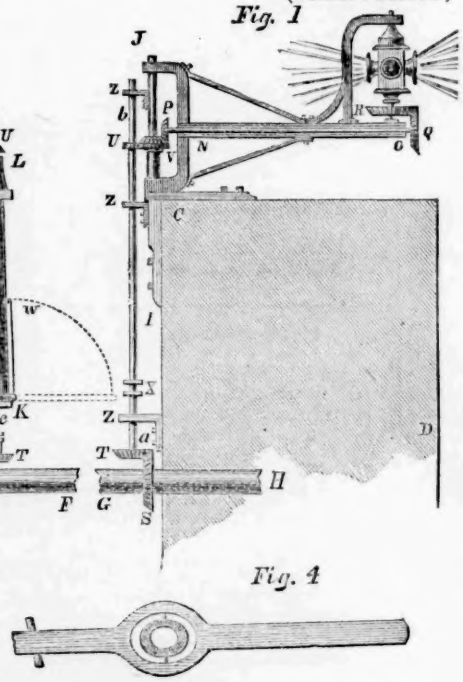

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft. On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel-house, but in this device, the rod c U, does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

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